

A Report on Protected Areas, Biodiversity, and Conservation in the Kyrgyzstan Tian Shan

**with Brief Notes on the Kyrgyzstan Pamir-Alai and the Tian
Shan Mountains of Kazakhstan, Uzbekistan, and China**



John D. Farrington

June 2005

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Cover Photo: Valley of the Tian Shan Range, Issyk-Kul Province, Kyrgyzstan.

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Preface

Kyrgyzstan is a land of towering mountains, glaciers, rushing streams, wildflower-covered meadows, forests, snow leopards, soaring eagles, and yurt-dwelling nomads. The entire nation lies astride the Tian Shan¹, Chinese for “Heavenly Mountains”, one of the world’s highest mountain ranges, which is 7439 m (24,400 ft) in elevation at its highest point. The nation is the second smallest of the former Soviet Central Asian republics. In spite of Kyrgyzstan’s diverse wildlife and stunning natural beauty, the nation remains little known, and, as yet, still on the frontier of international conservation efforts.

The following report is the product of 12 months of research into the state of conservation and land-use in Kyrgyzstan. This effort was funded by the Fulbright Commission of the U.S. State Department, and represents the most recent findings of the author’s personal environmental journey through Inner Asia, which began in 1999. When I first started my preliminary research for this project, I was extremely surprised to learn that, even though the Tian Shan Range has tremendous ecological significance for conservation efforts in middle Asia, there wasn’t a single major international conservation organization with an office in the former Soviet Central Asian republics. Even more surprising was how little awareness there is of conservation issues in the Tian Shan region amongst conservation workers in neighboring areas who are attempting to preserve similar species assemblages and ecosystems to those found in the Tian Shan. Given this lack of awareness, and the great potential for the international community to make a positive contribution towards improving the current state of biodiversity conservation in Kyrgyzstan and Central Asia, I have summarized my findings on protected areas and conservation in Kyrgyzstan and the Tian Shan of Kazakhstan, Uzbekistan, and Xinjiang in the chapters below.

The report begins with some brief background information on geography and society in the Kyrgyz Republic, followed by an overview of biodiversity and the state of conservation in the nation, which at the present time closely parallels the state of conservation in the other former Soviet Central Asian republics. Part IV of the report provides a catalog of all major protected areas in Kyrgyzstan and the other Tian Shan nations, followed by a list of sites in Kyrgyzstan that are as yet unprotected but merit protection. In the appendices the reader will find fairly comprehensive species lists of flora and fauna found in the Kyrgyz Republic, including lists of mammals, birds, fish, reptiles, amphibians, trees and shrubs, wildflowers, and endemic plants. In addition, a draft paper on the history and current practice of pastoral nomadism in Kyrgyzstan has been included in Appendix A.

While the research emphasis for this study was on eastern Kyrgyzstan, over the course of the study the author did have the opportunity to make brief journeys to southern

¹ “Tian Shan” is also frequently written as “Tien Shan” using an older transliteration system.

Kyrgyzstan, Uzbekistan, Kazakhstan, and Xinjiang. While falling short of being a definitive survey of protected areas of the Tian Shan, the informational review which follows is the first attempt at bringing the details of conservation efforts throughout the entire Tian Shan Range together in one place. It is hoped that this summary of biodiversity and conservation in the Tian Shan will generate interest in the region amongst conservationists, and help increase efforts to protect this surprisingly unknown range that forms an island of meadows, rivers, lakes, and forests in the arid heart of Asia.

John D. Farrington

Part I.

Introduction to Kyrgyzstan

A. Location and Regions of Kyrgyzstan

B. Climate

C. History

D. People

E. Religion

F. Government

G. Economy

H. Semi-Nomadic Livestock Herding

A. Location and Regions of Kyrgyzstan

The Kyrgyz Republic is a mountainous nation located in the heart of Central Asia, the second smallest of the five former Soviet Central Asian republics. The nation shares international borders with Kazakhstan to the north, Uzbekistan to the west, Tajikistan to the southwest, and the Chinese province of Xinjiang to the southeast. With an area of 198,500 sq. km (76,640 sq. mi.), Kyrgyzstan is about the same size as the American state of Nebraska or the former Soviet Republic of Belarus. The nation is divided into seven provinces, Chu, Issyk-Kul, Naryn, Osh, Batken, Jalalabad, and Talas (Map 2). The national capital is the city of Bishkek, located at an approximate latitude and longitude of 43° N, 75° E.

Geographically, Kyrgyzstan is divided into two lobes, commonly known as “Northern” and “Southern” Kyrgyzstan, which are topographically isolated from each other and culturally distinct. The larger northern lobe is dominated by the western half of the Tian Shan Range, while the smaller southern lobe is dominated by the rim of the Ferghana Valley and the Pamir-Alai Ranges, a group of mountains which form the northern most part of the Pamir Knot. The politically turbulent Ferghana Valley of Uzbekistan separates the two lobes. The northwest-southeast oriented Ferghana Range forms the cultural boundary between Northern and Southern Kyrgyzstan (Map 3).

In Kyrgyz environmental literature, the Tian Shan is commonly subdivided into four geographic sub-regions, the West, Inner, Northern, and Central Tian Shan. The term “West Tian Shan” generally refers to the Tian Shan in the provinces of Jalalabad and southern Talas, including short extensions of the range west of these provinces in Uzbekistan and Kazakhstan. The term “Inner Tian Shan” refers to the high grassland valleys and tundra plateaus in Naryn, southern Issyk-Kul, and southern Chu Provinces, located roughly south of the Kyrgyz and Terskey Ranges and north of the Kakshaal Range, which straddles the Chinese border. The term “Northern Tian Shan” refers to the Kyrgyz, Kungoy, and Zaile Ranges, which run much of the length of the shared border between Kyrgyzstan and Kazakhstan. Finally, the term “Central Tian Shan” refers to the ranges in the eastern tip of Issyk-Kul province, roughly being all territory east of a line connecting the communities of Karakol and Ak-Shirak (Map 4).

B. Climate

Kyrgyzstan has a continental climate. Winters in the highland areas are harsh, with low temperatures commonly in the -20°C to -30°C (-4 °F to -22°F) range, while in Bishkek winter low temperatures for the most part hover between 0°C and -10°C (32°F and 14°F). In summer, high temperatures in the lowland areas, such as the Ferghana Valley, can reach 40°C (104°F), while at higher elevations temperatures are significantly cooler. Precipitation occurs year round, however most rain falls from May to August, with June and July generally being the wettest months, and December, January, and February being



Map 2. Provinces and Provincial Capitals of the Kyrgyz Republic.



Map 3. Approximate Cultural Boundary between Northern and Southern Kyrgyzstan.



Map 4. Geographic Sub-Regions of the Tian Shan frequently used in Environmental Literature about Kyrgyzstan: West, Northern, Central, and Inner Tian Shan.



Map 5. Glaciers, Lakes, and Rivers of the Kyrgyz Republic. Major glacier fields shown in white.

the driest. Annual precipitation totals vary widely throughout Kyrgyzstan, the maximum annual total being about 1000 mm (39.4 in.), which falls on the slopes surrounding the Ferghana Valley. Western Issyk-Kul Province only receives about 200 mm (7.9 in.) of precipitation per year, however, due to the lake effect, eastern Issyk-Kul receives 600 mm (23.6 in.) of precipitation annually (World Bank 1995, Aizen 1997a, Nifadiev 1999).

C. History

The territory of the Kyrgyz Republic has been at the crossroads of eastern and western civilization for more than two millennia, and over the ages has been occupied by numerous tribes and empires. In the eighth century B.C., the Tian Shan was occupied by the Scythians, an Aryan people who were nomadic pastoralists that wandered vast areas of Inner Asia. In the 2nd century B.C. a Sarmatian people, recorded by Chinese historians as the Wu-Sun, occupied the Lake Issyk-Kul basin and surrounding areas. At the same time, the Yuezhi occupied the Ferghana Valley and present-day southern Uzbekistan, after having been driven from the Chinese province of Gansu by the Xiongnu. In the second century B.C., the Ferghana Valley was of military importance to the Chinese Han Dynasty as the primary source of horses for China's military, while the whole of present day Kyrgyzstan was traversed by numerous caravan routes, known collectively as the Silk Road. In 36 B.C., Han military action on the Chu River drove the westward migrating Xiongnu out of Central Asia to live in historical obscurity until 376 A.D., when their descendants entered the Roman Empire to leave their mark on history as the Huns.



Twelfth-century Karakhanid mausoleum and minaret, Ozgon, Osh Province.

The Ephthalite Huns were an Altaic people who ruled the region from about 425 A.D. until being dispersed in 565 A.D., by the K k Turks, who also had their origins in the Altai, and who were probably descendants of the Xiongnu. The nomadic K k Turks ruled from eastern Mongolia to the Aral Sea, but made their winter quarters either at Lake Issyk-Kul or in the Talas River valley. The empire of the K k Turks collapsed in the mid-7th century and its remnants were defeated by the western armies of the Chinese Tang Dynasty. At the peak of Tang Empire in the 8th Century, all of Central Asia, from Kazakhstan's Lake Balkhash to Herat and Kabul in Afghanistan, was a Chinese protectorate. However, in the year 751 the Chinese were defeated by a joint Arab-Turkic army in the Talas River valley and driven back into present day Xinjiang. In 875, power in Central Asia north of the Tian Shan passed from Arab governors to the Persian Samanids, who ruled until being overthrown by the Muslim Kharakhanid Turks in 999. The Kharakanids capitals were located in Burana, 60 km (37 mi.) east of Bishkek, and in

Ozgon, in the Kyrgyz Ferghana Valley, the remnants of which are Kyrgyzstan's greatest architectural monuments.

The Karakhanids were defeated in 1141 by the Karakhitai, a sinicized Buddhist Mongol tribe originating in Manchuria that split off from the fleeing Khitans, who had ruled northeast China for 200 years until their ouster in 1125. The Karakhitai reigned over Central Asia from the western Gobi Desert to the Ferghana Valley until their defeat by the armies of Genghis Khan in 1218. The Tian Shan would continue to be ruled by increasingly fractious, later Islamized, Mongol tribes of the house of Chagatai, Genghis Khan's second son, until the end of 15th Century. However throughout much of the 14th and 15th centuries, these Mongol rulers were overshadowed by the Turkic Timurid dynasty to the west, beginning with the conquests of Tamerlane who ruled Ferghana and whose armies traversed the territory of modern Kyrgyzstan.



The Burana Tower, a restored 11th-Century Karakhanid minaret, Burana, Chu Province.

In 1500, the founders of the Uzbek Shaybanid dynasty seized control of the region, expelling Babur from Osh in the process, the then Timurid prince of Ferghana who went on to conquer northern India and establish the fabled Moghul Empire in 1526. About this time, the nomadic Kyrgyz, who trace their origins to south-central Siberia, settled permanently in the Tian Shan. By the late 18th century the region had been fractured into three independent, Uzbek-ruled khanates, Khiva, Bukhara, and Kokand, of which the Khanate of Kokand ruled all of the present day territory of Kyrgyzstan until being annexed by the Russian Empire in 1876. In 1924, the boundaries of the Kyrgyz Soviet Socialist Republic were delineated by order of Stalin, and modern Kyrgyzstan came into being, which would declare independence from the Soviet Union in August of 1991. Today, the territory of Kyrgyzstan continues to be of strategic geopolitical importance as the source of water for much of arid Central Asia, as a potential transit route for oil and gas pipelines from the Caspian Sea to China, and as an outpost of the war on terror, with both the Russian and American military having bases located near Bishkek. (Summarized from Grousset 1939 and Soucek 2000).

D. People

The Kyrgyz are a Turkic people who have their historically recorded origins in Siberia's upper Yenisey River basin, in and around the present day Tuvan Republic, where their existence was noted as early as the 7th century (Grousset 1939). The Kyrgyz briefly ruled

most of the territory of modern Mongolia from 840 to 925 AD, and were later swept up in the Mongol conquests of the 13th century, being pushed westward, eventually to settle permanently in the western half of the Tian Shan in the 16th century (Soucek 2000). The Kyrgyz are linguistically and culturally closely related to the Kazakhs, the languages of the two peoples being mutually comprehensible and both peoples having pastoral nomadism as the foundation of their cultural traditions.

The population of Kyrgyzstan today is about five million, and many Kyrgyz are proud to state that Kyrgyzstan is home to people of 80 different nationalities. The territory of present-day Kyrgyzstan was already a diverse mix of Central Asian peoples prior to the arrival of the Russians in the 1860s. However, the population of the region was further diversified through colonization by Slavic farmers in the second half of the 19th century, and later through mass deportation of Soviet minority populations from both European Russia and the Soviet Far East to Kyrgyzstan during the Second World War, including large numbers of ethnic Germans, Koreans, Tatars, and others.



Kyrgyz village elder, Naryn Province.



Kyrgyz herding family, mother and daughter, Naryn Province.

Although a diverse populace, as of 2001 three nationalities comprised 91 percent of the total population of the country, Kyrgyz 65.7 percent, Uzbeks 13.9 percent, Russians 11.7 percent, with Ukrainians running a distant fourth at 1 percent (Rowland 2002). Other peoples include Dungans, Uighurs, Kazakhs, Turkmen, Tajiks, and Kalmuks. Most non-Kyrgyz nationalities are found primarily in urban centers, such as the national capital, Bishkek, or the seven provincial capitals, although many Russians and Ukrainians remain in farming communities, particularly in Chu and Northern Issyk-Kul Provinces. The majority of the Uzbek population resides around the perimeters of the Ferghana valley in southern Kyrgyzstan.

Culturally, the Kyrgyz people are divided into two broad groups, the Northern Clans and the Southern Clans with the geographic boundary between the two being the Ferghana Range (Map 3). The southern Kyrgyz are considered to be socially more conservative than northerners, adhering more closely to the tenants of Islam and in general being religiously more observant, which many attribute to the strong cultural influence of the dominant Uzbek minority in the region. The Kyrgyz language as spoken by southern Kyrgyz also employs a greater usage of vocabulary borrowed from the Uzbek language than in the north.

Northern Kyrgyz are considered to be more secular, possibly a result of the larger Russian presence in the north of the country. To date, the Northern Clans have dominated the post-independence politics of Kyrgyzstan, much to the resentment of the geographically isolated southerners. The north-south schism is further exacerbated in winter when the only highway linking the two halves of the country can be closed for weeks at a time by heavy snows and avalanches, further isolating the southerners from the mainstream of the Kyrgyz economy and politics.

E. Religion

With the exception of a few Christian converts and atheist hard-line communists, nearly all ethnic Kyrgyz consider themselves to be Sunni Muslims. However, at present, Kyrgyz who are strict adherents of Islam are a small minority - alcohol is a central part of any celebration in the nation, one can spend weeks in Kyrgyzstan without hearing the call to prayers, and cafes and restaurants remain open and full at lunchtime throughout the holy month of Ramadan. However, with the financial assistance of the Arab nations, nearly every major town and village has undertaken a Mosque building project since independence.

An interesting aspect of Islam as practiced in Kyrgyzstan is the continuing influence of ancient shamanistic beliefs which still pervade rural Kyrgyz society. The practice of shamanism in Kyrgyzstan is sometimes referred to as “Tengrianity”, the philosophical development of ancestral Central Asian nomads who lived in close harmony with the land in an exceptionally harsh climate. The basic belief of the shamanistic world is that all elements of nature, from mountains and rivers to plants and animals, are living entities endowed with spirits that are deserving of respect by humans, and that humans are by no means superior to these elements of nature but merely equals among them (Sarygulov 2003). Today, many Kyrgyz, who if asked their religion would say they were Muslim, continue various shamanistic practices and do not feel that these are in any way inconsistent with their Islamic faith. These practices include the use of shamanistic healers and the worship of natural sites that are considered to be sacred and have been traditionally protected, such as groves of trees, springs, waterfalls, rock outcrops, or isolated hills and mountains.



Sacred “wishing tree” tied with strips of cloth, Barskoon Waterfall, Naryn Province.

While all of the other Central Asian nationalities in Kyrgyzstan are also nominally Muslims, the Slavic minorities are for the most part Russian Orthodox Christians, and Russian Christmas, January 7th, continues to be a national holiday in the Kyrgyz Republic.

F. Government

In terms of governance, Kyrgyzstan is a parliamentary democracy, and in the early 1990s was originally lauded by foreign observers as an island of pluralistic democracy in a sea of authoritarian states. While Kyrgyzstan is still by far the freest, most democratic nation in Central Asia, the situation has been far from ideal. Askar Akaev rose to power as the president of the then Kyrgyz Soviet Socialist Republic in 1990. Immediately following independence in 1991, elections were held and Akaev won an interim presidential term running unopposed. Two years later, in January of 1994, elections were held again, and Akaev won an extension of his term until October 1996.

However, the nascent democratic process in Kyrgyzstan was first usurped by the increasingly authoritarian tendencies of President Akaev in September of 1994, when, with the economy continuing to deteriorate and opposition to his rule growing, he dissolved parliament. In October of 1995, Akaev called for new presidential elections. After having three candidates disqualified from running, in December of 1995 Akaev was re-elected to a 5-year term and proceeded to amend the constitution to augment his powers (Kubicek 1998). The legitimacy of the electoral process in the Kyrgyz Republic was further discredited during the 2000 presidential election, when the former vice president, national security service chief, and governor of Chu Province, Felix Kulov, announced his candidacy for president. Considered to be President Akaev's chief opponent, Kulov was promptly jailed on corruption charges one month after his announcement, and was later tried and given a 10-year prison sentence (Otorbaev 2003). Meanwhile President Akaev went on to win a third term of office.

Although President Akaev had taken the regionally unprecedented step of promising not to seek a fourth term of office in the 2005 elections, in the tradition of Central Asian clan politics, the president's daughter, son, and two sisters-in-law all stood in the February 2005 parliamentary elections. However, the leading candidate opposing the president's daughter, a popular former foreign minister, was disqualified from running beforehand (Saidazimova 2005). Following the elections, which were said to be flawed by foreign election observers, protests demanding free and fair elections began in southern Kyrgyzstan and quickly spread to the north. In March 2005, President Akaev fled the country in the face of violent protests in Bishkek that were said to number 5000 protesters. On July 10, 2005, the first Kyrgyz presidential elections without President Akaev were held. Kurmanbek Bakiyev, a southerner, emerged victorious, with a reported 88 percent of the popular vote in polling that was described by foreign election observers as being "largely" free and fair, and a great improvement over the February election.

G. Economy

During the Soviet Era, the principal industries of Kyrgyzstan were the production of wool and meat, uranium and tin mining, some textile factories, and defense production that included a torpedo development facility on Lake Issyk-Kul and a number of factories in Bishkek which specialized in production of airplane components. With independence in 1991, all of these industries collapsed, and most people were forced into self-employed subsistence occupations, such as being small farmers and livestock owners, or small traders shuttling back and forth between China, Kazakhstan, Russia and elsewhere in the region with all the trade goods one person can carry.



Herding sheep, Lake Chatyr-Kul, Naryn province.

In the 14 years since independence, few new industries have emerged in Kyrgyzstan, although the country has been opened to international mining investment, and the Canadian-owned Kumtor Gold Mine, one of the world's largest, now accounts for about 10 percent of Kyrgyz GDP in and of itself (TCA 2002). A German firm has opened one of the region's largest cigarette factories in Kyrgyzstan, and in spite of the turbulent political climate in the region, a steady stream of foreign tourists and hunters visit the country each year. In July and August, Lake Issyk-Kul draws thousands of tourists from throughout the former Soviet Union to its beaches. At present, there is a temporary boom in the export of Soviet-era scrap metal to China, with an estimated 50 to 60 truckloads per day leaving Kyrgyzstan. The steady rise in world wool prices since 2000 may one day lead to a revitalization of the Kyrgyz wool exporting industry, however, subsistence farming, semi-nomadic livestock herding, and trading in the bazaar continue to be the main occupations of the bulk of rural dwellers.

H. Semi-Nomadic Livestock Herding

The foundation of cultural identity amongst ethnic Kyrgyz lies in the ancient practice of nomadic pastoralism, which has persisted on the grasslands of Inner Asia for several millennia. Prior to collectivization in the late 1920s, Kyrgyz herders followed a four-pasture annual migration cycle, from winter pastures in lowland valleys to summer pastures in mountain highlands, with intermediate pastures being occupied in spring and autumn. The Kyrgyz had no permanent settlements prior to the arrival of the Russians, and dwelled year round in yurts, the portable round felt tent found throughout Central Asia. So important is this cultural tradition to the Kyrgyz People that the national symbol on the Kyrgyz flag has a circular yurt roof frame at its center.

While all but a few Soviet-era herding collectives have been long since disbanded, each year thousands of herding families continue to migrate with their livestock between their home villages and summer pastures in the high mountains, where they remain for several months. For more on the history and current state of semi-nomadic livestock herding in Kyrgyzstan see Appendix A.



Herding couple milking mares, southern Issyk-Kul Province.

Part II.

The Mountains and Wildlife of Kyrgyzstan

A. Mountains

B. Glaciers, Lakes, and Rivers

- 1. Glaciers**
- 2. Lakes**
- 3. Rivers**

C. Ecosystems, Flora, and Fauna

- 1. Major Eco-Regions of Kyrgyzstan**
- 2. Natural Ecosystems of Kyrgyzstan**
- 3. Species Diversity**
 - Animals**
 - Plants**

A. Mountains

With the exception of a few, small, lowland areas on the Kazakh Steppe and in the Ferghana Valley, Kyrgyz territory is entirely comprised of the ranges, valleys, and plateaus of the Tian Shan and Pamir-Alai Ranges, with 94 percent of the nation's territory being higher than 1,000 m (~3300 ft) in elevation, while 40 percent of territory is above 3000 m (~10,000 ft) (World Bank 1995). The nation has two peaks which exceed 7000 m (~23,000 ft) in elevation.



Peak Pobeda, elevation 7489 m (24,400 ft.) from the Englichek Glacier, Issyk-Kul Province. The highest peak in the Tian Shan Range.
Photo by Pavel Van-Yu-Tsai.

The highest peak in the Tian Shan, Peak Pobeda (Kyrgyz: Jengish Chokusu, Chinese: Tuomuer Feng), has an elevation of 7439 m (24,400 ft), and is located in the Central Tian Shan on eastern Kyrgyzstan's shared border with China; it is only exceeded in height by the peaks of the Himalaya mountain belt, the Tibetan Plateau, and the Pamirs of Tajikistan (see Appendix B for a list of the world's highest mountain ranges). Kyrgyzstan's second highest mountain is Peak Lenin, elevation 7134 m (23,406 ft), which is located in the Trans-Alai Range of the northern Pamirs on Kyrgyzstan's international border with Tajikistan.

The Tian Shan itself is the longest mountain range in Asia north of the Tibetan Plateau, with a length of about 2400 km (1500 mi.) that stretches from the outskirts of Tashkent, Uzbekistan to eastern Xinjiang, China. The bulk of the range is about evenly split between Kyrgyzstan and China, and at its widest point in central Kyrgyzstan the Tian Shan is roughly 275 km (170 mi.) in width and comprised of six, closely spaced, parallel ranges, all exceeding 4000 m (13,120 ft) in height.

B. Glaciers, Lakes, and Rivers

The Kyrgyz Tian Shan and Pamirs of Tajikistan play a crucial role as the primary water catchments for almost all of former Soviet Central Asia, as well as for large parts of western Xinjiang, and are the sources of the two largest rivers flowing to the beleaguered Aral Sea, the Syr Darya and the Amu Darya. Thus these ranges permit large populations to exist in the arid region, and are of key importance to the national economies of the region, which are heavily dependent on irrigation-intensive agricultural systems. The division of water rights for waters originating in the Tian Shan and Pamir Ranges is one of the most hotly contested political issues in the Central Asia, and, consequently, one of the largest sources of regional conflict. While Kyrgyzstan and Tajikistan have an abundance of water, these two nations still abide by Soviet-era water allocation quotas,

whereby the rights to use the majority of water originating on their territories belong to their arid, downstream neighbors, who, in large part, use their allotments to operate vast cotton plantations. For more on the Aral Sea and water rights in Central Asia see Appendix C.

1. Glaciers

Glacier cover in Kyrgyzstan is extensive, with a total area of 8170 sq. km (3154 sq. mi.), or approximately four percent of national territory, while “permanent” snowfields cover still more of Kyrgyzstan’s highlands (Nifadiev 1999) (Map 5, pg. 15 above). Snow and glacier melt are an extremely important part of the



Glacier fields of the Ak-Shirak Range, Issyk-Kul Province.

hydrological cycle in the Tian Shan, with glacier melt alone accounting for, on average, about 10 percent of flow from mountain streams, which can increase to 20 percent during time of drought (Aizen 1997a). In some river basins, such as the arid Tarim River basin in Xinjiang, which is fed in part by many rivers originating in Kyrgyzstan, glacier melt alone can account for 40 percent of total flow (Aizen 1997a).

The most extensive ice fields in Kyrgyzstan are found around the Peak Pobeda-Peak Khan-Tengri Massif, which extend into Kazakhstan and Xinjiang and include more than 1200 glaciers with a total area spanning the three countries of 4320 sq. km (1668 sq. mi.) (Aizen 1997b). In Kyrgyzstan, the single longest glacier in these icefields is the Engilchek Glacier, which is some 50 km (30 mi.) in length.

However, between 1935 and 1985 Kyrgyzstan’s glaciers lost anywhere from 5 to 27 percent of their mass (Aizen 1997a). More recently, researchers working in the Zaile Range of Kazakhstan’s northern Tian Shan, which forms the Kyrgyz-Kazakh border between Kazakhstan’s largest city, Almaty, and Kyrgyzstan’s Lake Issyk-Kul, have found that the area of glacier cover in the range is decreasing rapidly, having been reduced from about 270 sq. km (104 sq. mi.) in 1955 to just over 200 sq. km (77 sq. mi.) in 2000. The 416 glaciers in the range have lost nearly two cubic kilometers (0.5 cu. mi.) of ice over the same period, and between 1974 and 1990 have lost about 1.28 percent of their volume each year, in all likelihood due to global warming which has resulted in a small rise in temperature of about 0.5°C over the last 60 years. Scientists anticipate that most glaciers in the Zaile Range will disappear completely over the next 20 years, with potentially serious consequences for the region’s irrigation based agricultural systems, as about 75 percent of river flow in the area comes from rivers that originate in the Zaile ice fields (Blua 2003, Kirby 2003a).

2. Lakes

Kyrgyzstan's four largest natural lakes are Lake Issyk-Kul, for which Issyk-Kul Province is named, Lakes Song-Kul and Chatyr-Kul in Naryn Province, and Lake Sary-Chelek in Jalalabad Province (Table 1, Map 5). All four lakes are important summer nesting grounds for migratory waterfowl, and Lake Issyk-Kul, which doesn't freeze in winter, is



Kungoy Range, Lake Issyk-Kul.

also an important wintering ground for a number of waterfowl species. The Kyrgyz describe Lake Issyk-Kul as the second largest mountain lake in the world after South America's Lake Titicaca, and the entire lake has been designated a Wetland of International Importance under the Ramsar program. Furthermore Lake Issyk-Kul lies at the heart of a United Nations Educational, Scientific, and Cultural Organization (UNESCO) Man and the Biosphere Program (MAB) designated biosphere reserve that encompasses Issyk-Kul Province in its entirety, while Lake Sary-Chelek is the centerpiece of a smaller UNESCO-MAB biosphere reserve in the West Tian Shan. All four lakes are either partially or entirely protected in national level nature reserves and discussed in more detail in Part IV of this report.

Table 1. Kyrgyzstan's Largest Natural Lakes

Lake	Province	Area	Depth	Elevation
Issyk-Kul	Issyk-Kul	6236 sq. km 2408 sq. mi.	668 m 2191 ft	1608 m 5250 ft
Song-Kul	Naryn	273 sq. km 105 sq. mi.	15 m 49 ft	3028 m 9934 ft
Chatyr-Kul	Naryn	150 sq. km 58 sq. mi.	20 m 66 ft	3560 m 11,677 ft
Sary-Chelek	Jalalabad	13.9 sq. km 5.4 sq. mi.	244 m 800 ft	1876 m 6153 ft

Source: Konurbaev 2003.

Note: By way of comparison, the area of Lake Titicaca is about 8400 sq. km (3200 sq. mi.), while the area of California's Lake Tahoe is about 505 sq. km (193 sq. mi.).

In addition to these four lakes there are numerous smaller mountain lakes scattered throughout Kyrgyzstan, including a number of morainal lakes that are forming at high

altitude in areas experiencing rapid glacial retreat - which pose a potential flash flood hazard to downstream communities should a damming moraine burst suddenly. There are also about a dozen Soviet-era reservoirs that were built primarily for generating power, the largest of which is the Toktogul Reservoir on the Naryn River in central Jalalabad Province, which is 60 km (37 mi.) long, 12 km (7.5 mi.) wide, and has a total surface area of 265 sq. km (102 sq. mi.). Two lakes of scientific interest are the ice-bound Merzbacher Lakes, which lie entirely on the North Engilchek Glacier in eastern Naryn Province and fill with floating icebergs each summer.

3. Rivers

The most important rivers which have all, or portions, of their headwaters lying within Kyrgyz territory are those of the Syr Darya, Amu Darya, Tarim, Chu, and Talas Rivers, none of which reach the world's oceans (World Bank 1995, Map 5). The Syr Darya and Amu Darya are the life-blood of the agricultural economies of Turkmenistan, Uzbekistan, and western Kazakhstan, the misuse of which has led to the present Aral Sea crisis. The Naryn River is the longest and most important river in Kyrgyzstan, and is one of two rivers originating on Kyrgyz territory that join in the Ferghana Valley of Uzbekistan to form the Syr Darya, the other being the Kara Darya which originates in Osh Province. The Naryn gathers high in the tundra bogs of the Ak-Shirak Range, at an elevation of about 3800 m (12,500 ft), from where its source waters flow only a few kilometers before being immediately impounded by the reservoir of the Kumtor Gold Mine. The river then proceeds to flow roughly 600 km (373 mi.) to Uzbekistan, filling three major reservoirs en route that are the source of much of Kyrgyzstan's electricity.

The Kyzyl-Suu River is located in the broad valley separating the Alai and Trans-Alai Ranges of the northern Pamir in Osh province, where the river flows about 180 km (112 mi.) before entering Tajikistan. While not of great economic importance for Kyrgyzstan, the river is geographically significant as the northern-most tributary in the headwaters of the Amu Darya, known in antiquity as the Oxus, the longest river in Central Asia and throughout human history the region's most important.

The Sary-Jaz and Ak-Sai Rivers are two large rivers that form in the ice and snow fields of eastern Issyk-Kul and southern Naryn Provinces, which flow about 110 km (68 mi.) and 170 km (106 mi.), respectively, through sparsely populated terrain before entering China. The two rivers join north of the city of Aksu in Xinjiang Province to form the Aksu River, one of the most important tributaries of the Tarim River, which flows through Xinjiang's vast Taklimakan Desert and permits human habitation of this arid region.

The Chu and Talas Rivers are located in the north of Kyrgyzstan, and both are diverted into large, Soviet-era, irrigation canal systems that permit intensive cultivation of these two densely populated valleys. The Chu River flows 221 km (137 mi.) within Kyrgyzstan and, significantly, forms a large section of the international border with Kazakhstan,

while the Talas River flows for 102 km (63 mi.) on Kyrgyz territory before also entering Kazakhstan (Konurbaev 2003). Both rivers are also important sources of water for communities in Kazakhstan.

C. Ecosystems, Flora, and Fauna

The Tian Shan, with its extensive ice fields and hundreds of rushing rivers and creeks, forms a well-watered ecological island of mountain meadows, forests, and lakes in the arid heart of Asia, being bounded on the south by the vast Taklimakan Desert of Xinjiang, and to the north by the dry steppes of Kazakhstan.

The geologic history of the Tian Shan is one of rapid uplift forming multiple, parallel ranges (Knapp 1996, Bullen 2003). These geologic processes have led to the formation of a large number of long, roughly parallel valleys with wide altitudinal variation. One result of this geologic history has been the formation of numerous, closely spaced, and extremely varied microclimates. These microclimates in turn have led to the formation of a large number of remarkably diverse ecosystems that occur over a relatively small area, and include a number of relict ecosystems that have survived in mountain valleys as the Tian Shan has become more geographically isolated with the increasing aridity of the surrounding region (Agakhanyantz 1978). In total, the ecological diversity of Kyrgyzstan has been classified into seven major eco-regions and 21 natural ecosystems (Daviesson 2001a, MEP 1998).

1. Major Eco-Regions of Kyrgyzstan

(Summarized from Daviesson 2001a. For characteristic plants and animals of each eco-region, see Table 2.)

- **Deserts** – occurring mainly in valleys and foothills between elevations of about 400 and 1600 m (1300 to 5200 ft), and also on syrtlands, high tundra dominated plateaus with elevations ranging from 2400 to 3500 m (7900 to 11,500 ft).
- **Semi-Deserts** – occurring in valleys and foothills between elevations of about 600 and 2000 m (2000 to 6600 ft).
- **Steppes**- widely distributed, including small portions of the open Kazakh Steppe and mountain steppes with elevations ranging from about 600 to 3000 m (2000 to 9800 ft).
- **Forests** - including spruce forests occurring between elevations of about 1700 and 3200 m (5600 to 10,500 ft), juniper forests from about 900 to 2800 m (3000 to 9200 ft), relict wild walnut and fruit forests between about 1000 and 2200 m (3300 to 7200 ft), as well as riparian forests which are also sometimes referred to as tugai forests.
- **Deciduous Shrublands** – widely distributed between elevations of about 1500 and 3000 m (4900 to 9800 ft).
- **Meadows** – found in forest belts, sub-alpine, and alpine zones at elevations ranging from 1900 to 3600 m (6200 to 11,800 ft).
- **Wetlands** and marshes are not common in Kyrgyzstan, although fairly extensive in some locations, such as along large rivers or along sections of the shore of Lake Issyk-Kul and other lakes, particularly in delta areas.

Table 2. Characteristic Plants and Animals of Kyrgyzstan's Eco Regions

Eco-region	Characteristic Plant Species	Characteristic Animal Species
Desert	A) Lowland Deserts: <i>Salsola spp.</i> , <i>Suaeda physophora</i> , <i>Ephedra spp.</i> , <i>Sympegma regelii</i> B) Desert Syrts: <i>Reaumuria kaschgarica</i> , <i>Artemisia rhodantha</i> , various cushion plants	marbled polecat, gray monitor, sandgrouse
Semi-Deserts	<i>Artemisia spp.</i>	various birds of prey, bustards, gazelle
Steppes	<i>Stipa spp.</i> , <i>Festuca sulcata</i> , <i>Hordeum bulbosum</i> , <i>Elytrigia trichophora</i> <i>Bothriochloa ischaemum</i> , various bunchgrass-herbaceous mixes	eagles, falcons, marmot, argali
Forests	a) Spruce Forests: <i>Picea schrenkiana</i> , <i>Sorbus tianschanica</i> , <i>Sorbus persica</i> , <i>Salix tianschanica</i> , honeysuckle, brambles b) Juniper forests: <i>Juniperus semiglobosa</i> , <i>Juniperus seravschanica</i> , <i>Juniperus turkestanica</i> c) Walnut Forests: <i>Juglans regia</i> , <i>Malus sieversii</i> , <i>Prunus ferganica</i> , <i>Pyrus korshinskyi</i> , various hawthorn species d) Riparian Forests: <i>Populus spp.</i> , <i>Salix spp.</i> , <i>Betula spp.</i> , <i>Berberis spp.</i> , <i>Hippophae rhamnoides</i>	a) hawk owl, merlin, black grouse, elk, roe deer, wolves, brown bear b) bird species of Himalayan fauna c) rich bird and mammal community including brown bear, Eurasian lynx, wild boar d) fauna from desert, steppe, and wetland eco-regions
Deciduous Shrub-lands	<i>Rosa spp.</i> , <i>Carnage spp.</i> , <i>Cotoneaster spp.</i> , <i>Spiraea spp.</i> , mixed with <i>Juniperus spp.</i>	diverse fauna of adjoining eco-regions
Meadows	<i>Alchemilla spp.</i> , <i>Geranium spp.</i>	marmot, weasel, marten, snow leopard, Siberian ibex, golden eagle, lammergeyer, ibisbill
Wetlands	<i>Phragmites communis</i> , <i>Hippophae rhamnoides</i>	migratory waterfowl, however, few marshes due to steep terrain

Source: summarized from Daviesson 2001a.

Note: For more detailed lists with Latin and common names of flora and fauna in the Kyrgyz Republic, please see the appendices.

2. Natural Ecosystems of Kyrgyzstan

The seven major eco-regions above have been sub-classified into 21 distinct natural ecosystem listed in Table 3, below.

Table 3. Natural Ecosystems of Kyrgyzstan

Ecosystem	Total Area (sq. km)	Percent of National Territory
1. Spruce Forest	2772	1.4
2. Juniper Forest	2680	1.4
3. Broad-leaved Forest	464	0.23
4. River Forest (tugai)	226	0.11
5. Small-leaved Forest	711	0.36
6. Mid-mountain Deciduous Shrubland	970	0.49
7. Mid-mountain Pterophilic Shrubland	2317	1.2
8. Savannah	6081	3.1
9. Almond and Pistachio Forest	182	0.09
10. Glacier and Subglacier	11,527	5.8
11. Cryophilic Meadow	27,242	13.8
12. Cryophilic Steppe	21,413	10.8
13. Cryophilic Desert	1911	0.97
14. Mid-mountain Meadow	8764	4.4
15. Mid-mountain Steppe	17,643	8.9
16. Mid-mountain Desert	2543	1.3
18. Foothill Steppe	823	0.41
19. Foothill Desert	8768	4.4
20. Pterophilic Lowland Shrub	181	0.09
21. Lakes and Wetlands	~8000	4
Totals	~125,200	~63 percent

Source: (MEP 1998).

Note: For area in square miles, divide by 2.59

Of the remaining 37 percent of Kyrgyz Territory, 7.7 percent is classified as arable land, 23 percent as lifeless rock and ice, while the remainder is presumably urban or other types of land (MEP 1998).

3. Species Diversity

The Tian Shan forms an ecological bridge that loosely connects the mountain ranges of South Asia, including the Himalaya, Pamir, and Hindu Kush, with the remote, Inner Asian ranges of Mongolia and Siberia, most notably the Altai and Sayan Ranges. As a consequence of this geographic positioning and the increasingly arid environment of the surrounding region, the Tian Shan serves as an important corridor for the movement and dispersal of mountain dwelling species between the ranges of Inner and South Asia, and is a meeting place for flora and fauna representative of Central Asia, Inner Asia, Tibet, South Asia, and even East Asia, Europe, and the Mediterranean (Daviesson 2001a, Agakhanyantz 1978, Finch 1996, Schaller 1998). Thus, the combination of the Kyrgyz Republic's geographic positioning, numerous microclimates, and variety of relict ecosystems, has endowed the nation with remarkable species diversity for a small temperate country at the center of an exceptionally arid region of the world.

Animals

There are 563 vertebrate species and over 10,000 invertebrate species that have so far been identified in Kyrgyzstan (Tables 4 and 5). Notable vertebrate species include the snow leopard (*Uncia uncia*), argali (*Ovis ammon*), Pallas's cat (*Felis manul*), and the Himalayan griffon (*Gyps himalyensis*), while one noteworthy invertebrate species is *Gammarus krevetki* a freshwater shrimp. The four mammals to the region are the Tien Shan striped field mouse (*Apodemus agrarius tianschanicus*), Tien Shan brown bear (*Ursus arctos isabellinus*), Menzbier's marmot (*Marmota menzbieri*) and the Tien Shan ground squirrel (*Spermophilus relictus*) (MEP 1998, Daviesson 2001a). Other endemic vertebrates include 10 species or subspecies of fish found only in Lake Issyk-Kul. For fairly complete lists of mammals, birds, fish, reptiles, and amphibians found in Kyrgyzstan, see Appendices D-H.



Eastern roe deer, *Capreolus pygargus*, Naryn Province.

Table 4. Count of Vertebrate Species Identified in Kyrgyzstan by Taxa

Taxa	Number of Species in Kyrgyzstan	Number of Species Endemic to Kyrgyzstan	Number of Species in the Kyrgyz Red Book of Threatened Species	Number of Species on the IUCN Red Data Lists.
Fish	75	12	6	1
Amphibians	4	2	3	-
Reptiles	33	2	5	3
Birds	368	-	35	8
Mammals	83	4*	15	4
TOTALS	563	21	64	16

Source: Daviesson 2001a, MEP 1998.

* Endemic to the region.

Note: in the source literature there is some confusion in the use of the term endemic, with both species endemic to Kyrgyzstan and to the greater Central Asian region simply described as “endemic”.

Table 5. Count of Invertebrate Species in Kyrgyzstan by Type.

Type	Number of Species	Number Endemic	Percent Endemic
Insects	10,290	~3100	30 percent
Mollusks	168	~100	60 percent
Annelid Worms	1282	No Data	No Data
Spiders and Ticks	~250	No Data	No Data
Protozoa	~130	No Data	No Data
Total	~12,000	No Data	No Data

Source: MEP 1998, Daviesson 2001a, World Bank 1995.

Plants

Thus far, 3786 higher plants and 3676 lower plants have been identified in Kyrgyzstan, including more than 200 endemic plant species and 200 species of medicinal plants (Daviesson 2001a, MEP 1998, Tables 6 and 7). Among the higher plants, 71 species are considered to be threatened (Daviesson 2001a). Some of the most notable species of this flora are found in the wild fruit and nut forests of the West Tian Shan, which contain the progenitors of many of today's domesticated fruit and nut trees, such as wild species of walnut, almond, pistachio, apple, cherry, prune, and pear trees. Like patches of relict wild fruit and nut forests throughout the region, including those found in Turkmenistan, Uzbekistan, Kazakhstan, Xinjiang, the Caucasus, and elsewhere in Central and West Asia, the wild fruit and nut forests of Kyrgyzstan are considered to be an important genetic resource for development of future strains of pest and disease resistant domestic fruit and nut species (Fisher 2004, Tazi 1995, Zhang 2004). Furthermore, the walnut-fruit forests of southern Kyrgyzstan are considered to be the largest forest of this type still extant, and therefore of global importance as a genetic resource and an important site for biodiversity conservation efforts (Fisher 2004). Other notable plant species include Schrenk's spruce (*Picea schrenkiana*), which forms the widespread spruce forest belts of the Tian Shan, and the large and of diverse assemblage of wild flowers found in the region, including many wild species of tulip, iris, geranium, and crocus. For extensive lists of trees, shrubs, wildflowers, medicinal plants, edible mushrooms, and endemic plants found in Kyrgyzstan, see Appendices I - M.



Wild poppies (*Papaver croceum*), Naryn Province.

For a comparison of Kyrgyzstan's species diversity with species diversity of the four other former Soviet Central Asian republics, see Appendix N.

Table 6. Count of Higher Plants in Kyrgyzstan

Total Number of Higher Plant Species	Number of Endemic Higher Plants	Number of Threatened Higher Plants
3786	>200	71
Higher Plant Families with the Largest Representation	Plant Family Common Name	Number of Species
<i>Poaceae</i>	Grasses	224
<i>Fabaceae</i>	Legumes	222
<i>Asteraceae</i>	Asters	80
<i>Brassicaceae</i>	Mustards	73
<i>Rosaceae</i>	Roses	50
<i>Alliaceae</i>	Onion-Garlics	40

Source: MEP 1998, Daviesson 2001a.

Table 7. Count of Lower Plants in Kyrgyzstan

Total Number of Lower Plant Species		Lower Plant Type	Total Number of Species
3676		Fungi	~2000
		Algae	~300
		Lichens	No Data
		Mosses	No Data

Source: MEP 1998, Daviesson 2001a, World Bank 1995.

Part III.

Conservation in Kyrgyzstan

A. Present Threats to Biodiversity

- 1. Overharvesting of Animals and Plants**
- 2. Habitat Destruction**
 - Deforestation**
 - Overgrazing**
- 3. Fences and Highways**

B. Conservation in Kyrgyzstan

- 1. International Conventions**
- 2. Protected Area System**
 - Nature Reserves (*Zapovedniky*)**
 - National Parks (*Natsionalniye Parky*)**
 - Wildlife Sanctuaries (*Zakazniky*)**
 - Natural Monuments (*Prirodniye Pamyatniki*)**
 - International Protected Area Designations**
 - UNESCO World Heritage Designation**
 - Provincial Level Protected Areas**
- 3. Financial Problems of Protected Areas**

A. Present Threats to Biodiversity

As in much of the world, the rate of species extinctions in Central Asia is accelerating rapidly due to growth of human populations that are largely destitute and overexploiting a finite pool of natural resources. Notable species that have gone extinct in lowland Central Asia in the 20th century include the Turanian Tiger (*Panthera tigris virgata*), which formerly inhabited reed beds, wetlands, and riparian corridors from the Caspian Sea to Lakes Issyk-Kul and Balkhash, and the Asiatic Cheetah (*Acinonyx jubatus*), which once roamed arid grasslands from the Arabian Peninsula and Asia Minor to Southern Uzbekistan and India, of which only about 50 animals remain in Iran today (CAT 2005). Presently the striped hyena (*Hyaena hyaena*), Central Asian leopard, (*Panthera pardus ciscaucasica*) and a number of other large mammals are severely threatened (Daviessson 2001c, Daviessson 2001d).

In Kyrgyzstan today, at least 10 percent of the nation's vertebrate species are endangered, including 15 mammals, 35 birds, 5 reptiles, 6 fish, and 3 of the nation's 4 amphibian species, as well as 18 insects species and 71 plant species, although these numbers have no doubt risen since the last comprehensive national survey was conducted during the late Soviet period (World Bank 1995, Tables 4 and 6). Endangered species in Kyrgyzstan include mammals such as the snow leopard (*Uncia uncia*), Pallas's cat (*Felis manul*), Tien Shan brown bear (*Ursus arctos isabellinus*), dhole (*Cuon alpinus*), goitered gazelle (*Gazella subgutturosa*), marbled polecat (*Vormella peregusna negans*), Menzbier's marmot (*Marmota menzbieri*), and the otter (*Lutra lutra*); birds such as the great bustard (*Otis tarda*), imperial eagle (*Aquila heliaca*) and the ibisbill (*Ibidorhyncha struthersii*); the grey monitor lizard (*Varanus griseus*); the endemic mollusk *Siraphoroides moltschanovi*; a number of wild tulip species, including *Tulipa nitida*, *Tulipa ostrowskiana*, and *Tulipa rosea*; and the wild pomegranate (*Punica granatum*) (MEP 1998).

Threats to the biodiversity of Kyrgyzstan and the wider region can be lumped into two broad categories: 1) overharvesting of plants and animals, including poaching; and 2) habitat destruction. While during the Soviet era industrial pollution and use of excess quantities of agricultural chemicals also posed a large threat to wildlife in areas of Kyrgyzstan, with the collapse of the economy in the early 1990s, nearly all factories in Kyrgyzstan have long since closed, while small, private Kyrgyz farmers can no longer afford to apply the exorbitant quantities of fertilizers and pesticides that were used prior to independence. However, due to the opening of the Kyrgyz Republic to foreign mining investment in the 1990s, mining waste and pollution will probably pose an increasingly large threat to wildlife in the Kyrgyzstan in the decades to come.

1. Overharvesting of Animals and Plants

In the highlands of Kyrgyzstan, many species have been pushed to the brink of local extinction since the onset of the economic crisis of the 1990s, which hit rural areas

particularly hard. Disbandment of agricultural collectives left entire villages to get by on their own without state support for the first time in their existence (see Appendix A). In efforts to generate cash incomes or simply survive, many Kyrgyz turned to hunting, including the widespread poaching of endangered species, which resulted in a severe reduction of wild animal populations.



Winter kill, argali (*Ovis ammon*), Issyk-Kul Province.

Poaching has had an alarming impact on protected species such as the snow leopard, which was formerly found throughout Kyrgyzstan, and in the mid-1980s had an estimated population of 1200–1400 animals (ISLT 2003, Koshkarev 1988). However, independence in 1991 was accompanied by the mass impoverishment of rural populations, the reduction of salaries of law enforcement officials, which today are still less than US \$30 per month for many officers, and the opening of Kyrgyzstan's borders to international trade, including the border with China. One result of this tumultuous period has been a general breakdown of law enforcement measures concerning wildlife and protected areas, and by 1996 the estimated population of snow leopards had fallen by half to 650, as animals were trapped for fur and sale of parts for traditional Chinese medicine, while live cubs were sold to private zoos, fetching an estimated \$22,000 per cub (ISLT 2003, Kirby 2003b). Often the poachers and smugglers involved in this trade have been government officials and even protected area rangers (Otorbaev 2002). In 2003, it was estimated that as few as 150 snow leopards remained in Kyrgyzstan (Vorobeev 2003).

In addition to poaching for the Asian black market in wildlife products, there has been abundant poaching simply to obtain meat for survival. In one report, the Kyrgyz army border patrol stationed along the Tajikistan border was supplied with food rations that consisted solely of potatoes, leading one detachment of border guards armed with AK-47 assault rifles to state that they had no choice but to shoot three or four ibex or wild boar per day simply to feed themselves (Babakulov 2002).

Rural people, particularly semi-nomadic herders who dwell in the mountains, are faced with the choice of slaughtering their own animals for food, which could otherwise be sold or bartered in the market, or hunting and eating wildlife they come upon, such as argali, ibex, wild boar, elk, roe deer, and even marmots. Further complicating the situation is the current bounty on wolves, which was \$20 per adult male wolf and \$30 per adult female wolf in 1999, and the privatization of all livestock during the 1990s, both of which have given herders further economic incentive to carry firearms (Hazell 2001). While during the collective era the loss of a small percentage of state-owned sheep to wolves did not result in financial hardship for any individual, since privatization of livestock, the financial loss of a few sheep to a small herd owner can be devastating indeed.

Overfishing and the introduction of non-native fish to “improve” the Lake Issyk-Kul fishery have taken a devastating toll on the lake’s aquatic ecosystems, with introduced fish preying on native species and the overall commercial harvest of fish in the lake falling 86 percent over the 20-year period from 1965 to 1985 (Savvatiova 1999).

Overharvesting of wild plants, particularly medicinal plants and wildflowers which have a potential commercial value, has led to the rapid disappearance of many plant species, with the decline in the occurrence of these plants being most severe in areas immediately around villages (MEP 1998, Daviesson 2001a).

2. Habitat Destruction

At present, with the economy stalled and few development projects underway in Kyrgyzstan, habitat destruction due to urban sprawl or opening of new lands to agriculture by expansion of irrigation systems is a relatively minor problem. While there are numerous proposed dam projects that could increase Kyrgyzstan’s energy independence at the expense of important riparian habitat, as yet there is no source of financing to undertake these projects. At present, the two largest habitat destruction issues in Kyrgyzstan are deforestation and overgrazing.

Deforestation

The area of forest cover in Kyrgyzstan has fallen by about half this century, primarily due to excessive harvest of trees during the Second World War, and today forests cover about four percent of Kyrgyz territory (World Bank 1995, MEP 1998, Fisher 2004). However, Kyrgyzstan’s limited forests continue to be threatened by subsistence activities, such as cutting of trees for fuel by villagers who can not afford to buy gas and coal that are no longer subsidized; lack of tree regeneration due to overgrazing in forest areas; overcollection, especially of wild fruit trees; and even excessive cutting of young spruces for Christmas trees (World Bank 1995, Yunusova 2000, MEP 1998).

As a result of deforestation, habitat for many species, including numerous important game species, is being lost, particularly in narrow riparian corridors away from more extensive forests. Furthermore, deforestation also threatens the genetic diversity of rare wild fruit and nut forests as well as increasing the possibility of further habitat loss through erosion, landslides, and mudflows.



Schrenk's spruce (*Picea schrenkiana*), the most common tree of the Tian Shan.

Overgrazing

While the number of sheep in Kyrgyzstan has fallen dramatically since independence, from a peak of 10,313,000 sheep in 1989 to 3,716,100 in 1996, loss of habitat and species diversity due to overgrazing remains a severe problem in Kyrgyzstan (Appendix A: Table A1, MEP 1998). With the privatization of livestock, many individual small herd owners no longer own sufficient animals to make migration to distant summer pastures economically feasible. Consequently many villagers are now keeping their animals pastured around the village year round, a practice which has resulted in widespread erosion, landslides, proliferation of unpalatable woody plant species, and an overall reduction in pasture productivity (Fitzherbert 2000). While these developments adversely affect domestic animals residing on these lands, they also affect wild animals, particularly grazing animals, and lead to an overall reduction of wild plant species that are the preferred forage of both wild and domestic animals.



Hillslope suffering from Soviet-era overgrazing damage. Naryn Province, August 2004.

3. Fences and Highways

Other significant threats to biodiversity which have yet to be adequately investigated include both a barbed wire border fence along Kyrgyzstan's Chinese border and several proposed highway development projects to link the Chinese Province of Xinjiang with Kyrgyzstan and other nations in the region. The border fence consists of two to three parallel, multi-strand, barbed-wire fences spaced a couple of meters apart, which is located inside Kyrgyz territory and apparently runs much of the length of Kyrgyzstan's shared border with China. In the Torugart Pass/Ak-Sai area of Naryn Province, the fence runs continuously along the road for 40 km (25 mi.) before veering off into the mountains in both directions, and was probably erected in response to the border skirmishes which broke out between the Soviet Union and China along their 4000-mile shared border during the Sino-Soviet split of the 1960s. Depending on the total length and condition of this fence, it is potentially a formidable obstacle to the migration of large animal species, such as argali and ibex, to and from Xinjiang along much of Kyrgyzstan's southern border, and is possibly a major cause of habitat fragmentation in the Tian Shan.

Another potential source of large scale habitat fragmentation are several proposed highway projects to improve transportation links between Kyrgyzstan and Xinjiang via the Erkeshtam border post in Osh Province, Torugart Pass in Naryn Province, and Bedel Pass in Issyk-Kul Province (Map 7, pg. 104). The Osh-Kashgar road via Erkeshtam is

already a busy highway open to all international traffic, and one of the most important trade routes linking China to the former Soviet Central Asian republics. Traffic flow along the route is continuous day and night. However, although the road from Kashgar to the Kyrgyz border is a brand new, paved, double lane highway, the road deteriorates into a poorly maintained dirt track inside Kyrgyzstan, and is often closed due to avalanches. The Torugart Pass road is also a dirt track with a steady flow of truck traffic on it, however, it is subject to better maintenance and much lower avalanche risk than the Erkeshtam road. At present the Torugart Pass road is only open to Chinese and Kyrgyz traffic, however, if opened to all international traffic, the road would become the main highway linking the Kyrgyz capital, Bishkek, with China. Plans to improve these two international highways will certainly increase the already steady flow of traffic on these roads, and discourage the migration of large mammals across these transportation corridors. In addition to plans to improve the Torugart highway, there is also a plan to construct a railroad from Kashgar to the Ferghana Valley via Torugart Pass, which would create yet another physical impediment to migration of large fauna along the Tian Shan (ADB 2002).

Most worrisome from a conservation perspective is the proposed road from Xinjiang to Lake Issyk-Kul via Bedel Pass, which, if built, could result in severe fragmentation of alpine grazing habitat in eastern Kyrgyzstan. While all news of this road has been largely confined to rumor and speculation, as are most negotiations between Kyrgyz and Chinese parties, it is presumably linked to the development of a secretly negotiated, US \$200 million, Chinese-owned golf resort and hunting lodge proposed for the southeast shore of Lake Issyk-Kul (Jumagulov 2004, TCA 2004a, TCA 2004b). If constructed, the road will in all likelihood follow the ancient caravan route from the city of Aksu in Xinjiang, cross over Bedel Pass in the Kakshaal Range, and end in Barskoon on the south shore of Lake Issyk-Kul (Map 8, pg. 113). In the process, the road will neatly dissect the last large expanse of undeveloped land in eastern Kyrgyzstan, and further open up the mineral rich area to expanded mining activities.

In addition to these highways, there are numerous, shifting proposals to construct gas and oil pipelines between the Caspian Sea and China that may one day pass through Kyrgyz territory, which have a high potential to disrupt animal migration routes throughout Central Asia.

B. Conservation in Kyrgyzstan

To date, Kyrgyzstan and Soviet Central Asia have been largely overlooked by the international conservation community, even as efforts to save similar threatened species assemblages have been ongoing in neighboring countries for years. At present there is not a single major international conservation NGO with a permanent office in Central Asia, although some international development organizations are making limited efforts in this regard. In the present state of economic hardship, nature conservation is not a high

priority of the Kyrgyz government. However, a Soviet-era protected area system does exist that can serve as a solid foundation for future expansion of conservation efforts in the nation.

1. International Conventions

In 1996, the Kyrgyz Republic ratified the UN Convention on Biological Diversity, which was adopted at the 1992 United Nations “Earth Summit” in Rio de Janeiro (CBD 1992). As a first step in implementing this convention, the Kyrgyz government produced the biodiversity strategy and action plan which is widely referenced in this report (MEP 1998). However, in a somewhat contradictory lack of action, the Kyrgyz Republic has yet to ratify the much earlier 1973 UN Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), even though three of the nation’s four neighbors have already done so, China in 1981, Uzbekistan in 1997, and Kazakhstan in 2000 (CITES 1973).

2. Protected Area System

The national protected area system is overseen by the Kyrgyz State Forest Service in Bishkek. Presently, only about five percent of Kyrgyz territory is protected at the national level in a series of 90 or so “specially protected natural territories”. The protected area system in the Kyrgyz Republic has the following primary designations:

- State Nature Reserve (Russian/ru: *Gosudarstvenny Zapovednik*)
- State Natural National Park (ru: *Gosudarstvenny Prirodny Natsionalny Park*)
- State Wildlife Sanctuary (ru: *Gosudarstvenny Zakaznik*)
- State Natural Monuments (ru: *Gosudarstvenny Prirodny Pamyatnik*)

Other types of “protected areas” in the Kyrgyz system include zoos, botanical gardens, and health spas built around natural mineral springs. For an explanation of the International Union for the Conservation of Nature (IUCN) protected area categories which follow, see Appendix O.

Nature Reserves (*Zapovedniky*) - IUCN Category Ia

The highest level of protection is nominally afforded by the state nature reserves, which are lands set aside entirely for the benefit of wildlife, and which are, in principle at least, closed to the general public. Nature reserves are divided into two zones, the: 1) core zone, and 2) buffer zone. The core zone usually lies at the heart of the reserve, and contains the main habitat area and or species for which the reserve was created. The core zone is closed to all human activities except ranger patrols and scientific research.

Nature reserve buffer zones are integral parts of the reserve, and are areas where limited human activities are permitted. These activities are generally restricted to the subsistence activities of reserve rangers, such as grazing of horses and livestock and minimal cutting of wood for fuel and construction material. However, in some cases a few long time residents of the area may be permitted to continue using buffer zones as pastures. Today there are seven state reserves in Kyrgyzstan which cover about two percent of national territory (Table 8).

Table 8. Nature Reserves (*Zapovedniki*) of the Kyrgyz Republic - IUCN Category Ia.

Name	Area (sq. km)	Province	Year Established
Besh-Aral	632.0	Jalalabad	1979
Sary-Chelek	238.7	Jalalabad	1959
Padysha-Ata	305.6	Jalalabad	2002
Karatal-Japyryk	190.3 (in 3 sections)	Naryn	1994
Naryn	1080.2	Naryn	1983
Sarychat-Ertash	1341.4	Issyk-Kul	1995
Issyk-Kul	190.0 (in 10 sections)	Issyk-Kul	1948
Total Area	3978.2		
Percent of National Territory	2.0		

Source: SFSKR 2003, Tabyshalieva 2001, Heinen 2001.

National Parks (*Natsionalniye Prirodniye Parky*) – IUCN Category II

The second highest level of protection is afforded by national park designation. The purpose of the national parks is to not only protect important ecosystems and rare wildlife, like nature reserves, but also to provide the general public with outdoor recreational opportunities in a scenic natural setting. Thus, unlike the nature reserves, national parks welcome human visitation and charge entrance fees.

National Parks are divided into three zones, the: 1) prohibited zone, 2) recreation zone, and 3) production zone. The prohibited zone is usually located in a remote area of the park in an area of high ecological importance and is closed to the general public. Only rangers on patrol and scientists conducting approved research are permitted in the prohibited zone. The recreation zone is open to forms of outdoor recreation that are not overly disruptive to the natural environment and which are compatible with the objectives for which the park was created, such as hiking, camping, and picnicking. The production zone is a multi-use zone of the park where traditional subsistence activities are permitted, such as grazing, and in the case of parks in forested areas, limited logging operations, which generally include tree nurseries and afforestation projects as well as

timber cutting. Today there are eight national parks in Kyrgyzstan which cover about 1.4 percent of national territory (Table 9).

Table 9. National Parks of the Kyrgyz Republic - IUCN Category II.

Name	Area (sq. km)	Province	Year Established
Ala-Archa	194.0	Chu	1976
Besh-Tash	324.1	Talas	1996
Chong-Kemin	1265.1	Chu	1997
Karakol	381.0	Issyk-Kul	1997
Kara-Shoro	84.5	Osh	1996
Kyrgyz-Ata	111.7	Osh	1992
Saimaluu-Tash	320.0	Jalalabad	2001
Salkyn-Tor	104.5	Naryn	2001
Total Area	2784.9		
Percent of National Territory	1.4		

Source: SFSKR 2003, Tabysheva 2001, Heinen 2001.

Wildlife Sanctuaries (*Zakazniky*) – IUCN Category IV.

Wildlife Sanctuaries in Kyrgyzstan are, for the most part, essentially delimited “no-hunting” or “no-harvesting” zones in areas of high habitat potential for: 1) valuable game species such as pheasant, partridge, elk, wild boar, and ibex; or 2) rare plants, shrubs and trees. These areas are not zoned, have no specific management plans, and only have limited patrols, often being the responsibility of just one or two rangers. They are open to all economic activities permitted by law, such as grazing, gathering of non-endangered medicinal plants, and logging.

There are about 50 wildlife sanctuaries in Kyrgyzstan today that range in size from 5 to over 400 sq. km (2 to 155 sq. mi.), but in general are smaller and less well marked than either parks or nature reserves (Table 10, Tabysheva 2001, Heinen 2001).

Table 10. Wildlife Sanctuaries (ru: *Oxotnichi Zakazniki*) of the Kyrgyz Republic
Devoted to the Conservation of Hunted Game Species - IUCN Category IV.

Name	Area (sq. km)	Province	Year Established
Ak-Suu	76	Chu	1971
Jarly-Kaindy	140	Chu	1975
Suu-Samyr	22	Chu	1990
Tokmak	11	Chu	1958
Chong-Jargalchak	231	Issyk-Kul	1991
Jeti-Oguz	300	Issyk-Kul	1958
Keng-Suu	87	Issyk-Kul	1990
Teplokluchenka	290	Issyk-Kul	1958
Tup	191	Issyk-Kul	1975
Chichkan	366	Jalalabad	1972
Sandalash	441	Jalalabad	1975
Uzun-Ahmatski	23	Jalalabad	1975
Yasynski	62	Jalalabad	1976
Kochkor	23	Naryn	1976
Togus-Torouzski	237	Naryn	1975
Akburinski	136	Osh	1976
Gulchinski	5	Osh	1968
Talas	25	Talas	1986
Total Area	2666		
Percent of National Territory	1.3		

Source: Vorobeev 2003, Heinen 2001.

Natural Monuments (Prirodnive Pamyatniky)

Natural Monuments tend to be rather small in area, in general being just a few hectares in size, and only serve to protect isolated features of the landscape, such as a waterfall or a scenic rock outcrop. At present, there are 18 designated natural monuments in Kyrgyzstan which cover a total area of only 60 ha (148 acres), hence natural monuments make only a minor contribution to protecting the natural heritage of the Kyrgyz Republic (Tabyshalieva 2001).

Of the approximately 90 protected area units, in the Kyrgyz Republic today, only about 30 conform to IUCN designations for protected areas, the Nature Reserves, IUCN Category Ia “Strict Nature Reserves”, the National Parks, IUCN Category II “National Parks”, and the Wildlife Sanctuaries, IUCN Category IV “Wildlife Habitat Reserves” (Heinen 2001, Appendix O).

International Protected Area Designations

In addition to the national protected area system, Kyrgyzstan also participates in two international biodiversity conservation programs administered under the auspices of the IUCN and UNESCO. The first is the Ramsar Wetlands of International Importance program, under which all of Lake Issyk-Kul was designated a Ramsar Site in 2002 due to its size, uniqueness as a brackish mountain lake, and also due to its importance in Central Asia as both a summering and wintering ground for migratory waterfowl (Ramsar 2005, WI 2005).

The second is the UNESCO-MAB biosphere reserve program, which seeks to preserve natural and cultural landscapes of global importance for both the unique ecosystems and traditional cultures which these landscapes have fostered (UNESCO 2005a). Thus far two areas in Kyrgyzstan have been designated Biosphere Reserves under the MAB program. In 1976 UNESCO designated the Sary-Chelek State Nature Reserve a biosphere reserve due to the area's exceptionally high biodiversity which results from the valley's somewhat unique forest ecosystem, where spruce, fir, and wild fruit and nut type forests occur together (UNESCO 2005b). In 2001, UNESCO designated the entire province of Issyk-Kul a biosphere reserve based on both the province's rich natural and cultural heritage (UNESCO 2005c, Dompke 2004, Ulemann 2003, GTZ 1999).

UNESCO World Heritage Designation

At present, the Kyrgyz Republic has no natural or cultural sites inscribed upon the UNESCO list of World Heritage Sites, although a number of sites are potential candidates for world heritage designation, such as the sacred Peak Khan-Tengri, the Sarychat-Ertash Nature Reserve, the Karavshin Valley in Batken Province, and the 12th-century Kharakhanid Mausoleums of Ozgon.

Provincial Level Protected Areas

In addition to national and international level protected area designations, provincial governors can decree areas to be protected at the provincial level, although this process appears to be largely ad hoc, as in the case of a remote area of southeast Naryn Province which the governor recently declared to be a game reserve for the protection of the local argali population for a temporary period of five years.

3. Financial Problems of Protected Areas

The majority of protected areas in Kyrgyzstan today are protected in name only, and exist simply as lines on a map. As with most of the Kyrgyz Republic's current problems, the

Part III - Conservation in Kyrgyzstan

problems of the protected area system can be traced to the ongoing economic crisis of the post-independence period, and at present the system is severely underfunded. However, individual protected area units do have a high degree of autonomy in developing their own management plans and deciding on how their limited budgets are spent. At this time, these protected area budgets are extremely small. In the case of nature reserves and national parks, state funding typically provides for the upkeep of a small protected area office, one Russian jeep per unit, a half dozen horses, and salaries of about US \$25 per month for park administrators and about US \$18 per month for individual rangers. In the case of the wildlife sanctuaries, budgets are limited to the US \$18 per month salary of the one or two rangers hired to patrol the sanctuary.

Consequently, rangers are forced to spend much of their time engaged in other occupations to make ends meet, particularly livestock herding, and there is a very large temptation for rangers to engage in, or turn a blind eye to, illegal activities within the protected area boundaries, such as hunting and cutting of trees. In short, US \$18 per month buys very little protection indeed, and even dedicated rangers are unable to patrol large tracts of the protected areas much of the year due to a lack of adequate cold weather clothing and camping equipment necessary for travel to remote areas of the reserves. While most protected area workers agree that the business of poaching has declined somewhat since reaching its height in the late 1990's, this may in part be due to the fact that there are very few high-value animals, such as snow leopards and bears, left to poach. Transportation also continues to be problematic, as many roads to protected areas have not been maintained since independence and are barely passable or entirely closed many months of the year.

Prior to independence, being a park ranger in the USSR was a prestigious, well paid occupation as it continues to be in the world's developed nations. However this is no longer the case in Kyrgyzstan, and many reserves are finding it difficult to find dedicated rangers to patrol their territories.

PART IV.

Protected Areas of Kyrgyzstan and the Tian Shan of Kazakhstan, Uzbekistan and China

A. Protected Areas of the Eastern Kyrgyzstan Tian Shan

1. Protected Areas of Chu Province

Ala-Archa National Park

Chong-Kemin National Park

2. Protected Areas of Issyk-Kul Province

Issyk-Kul Nature Reserve

Keng-Suu Wildlife Sanctuary

Teplokluchenka Wildlife Sanctuary

Karakol National Park

Jeti-Oguz Wildlife Sanctuary

Sarychat-Ertash Nature Reserve

Chong-Jargalchak Wildlife Sanctuary

3. International Protected Area Designations of Issyk-Kul Province

Lake Issyk-Kul Ramsar Site

Issyk-Kul Biosphere Reserve

4. Protected Areas of Naryn Province

Karatal-Japyryk Nature Reserve

Karatal-Japyryk Nature Reserve – Section 1: Lake Song-Kul

Karatal-Japyryk Nature Reserve – Section 2: Karatal River Canyon

Karatal-Japyryk Nature Reserve – Section 3: Lake Chatyr-Kul

Salkyn-Tor National Park

Naryn Nature Reserve

Wildlife Sanctuaries in Naryn Province

B. Protected Areas of Western and Southern Kyrgyzstan

1. Tian Shan Range

i) Talas province

Besh-Tash National Park

Talas Wildlife Sanctuary

ii) Jalalabad Province

Besh-Aral Nature Reserve

Sary-Chelek Nature Reserve

Padysha-Ata Nature Reserve

Saimaluu-Tash National Park

2. Pamir-Alai Range

i) Osh Province

Kyrgyz-Ata National Park

Kara-Shoro National Park

ii) Batken Province

C. Protected Areas of the Kazakhstan Tian Shan

1. Northern Tian Shan - Almaty Province

Almaty Nature Reserve

Ile-Alatau National Park

2. Western Tian Shan – South Kazakhstan Province

Aksu-Jabagly Nature Reserve

D. Protected Areas of the Uzbekistan Tian Shan

Ugam-Chatkal National Park

Chatkal Nature Reserve

E. Protected Areas of the Xinjiang Tian Shan, China

Tuomuer Peak Nature Reserve

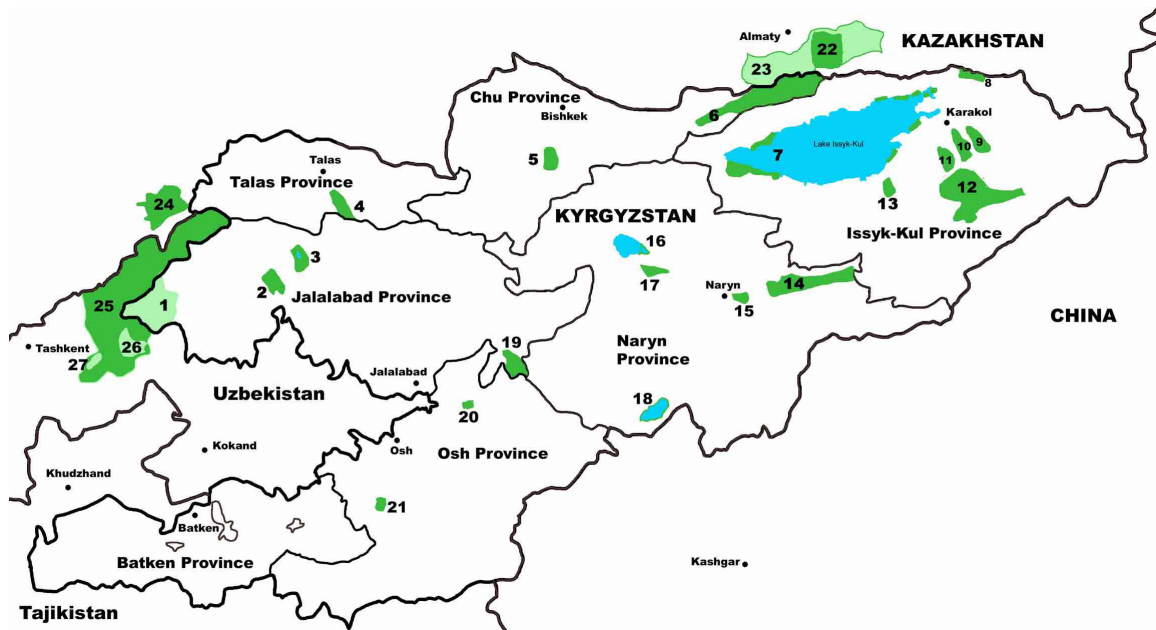
Western Tian Shan Nature Reserve

Bayanbulak Swan Nature Reserve

Middle Tian Shan Gongnaisi Alpine Meadow Nature Reserve

Bogeda Peak Biosphere Reserve

Eastern Tianshan Nature Reserve



Map 6. Protected Areas of the Kyrgyzstan, Kazakhstan, and Uzbekistan Tian Shan.

1. Besh-Aral Nature Reserve
2. Padysha-Ata Nature Reserve
3. Sary-Chelek Nature Reserve
4. Besh-Tash National Park
5. Ala-Archa National Park
6. Chong-Kemin National Park
7. Issyk-Kul Nature Reserve (10 Sections)
8. Keng-Suu Wildlife Sanctuary
9. Teplokluchenska Wildlife Sanctuary
10. Karakol National Park
11. Jeti-Oguz Wildlife Sanctuary
12. Sarychat-Ertash Nature Reserve
13. Chong-Jargylchak Nature Reserve
14. Naryn Nature Reserve
15. Salkyn-Tor National Park
16. Karatal-Japyryk Nature Reserve – Section 1: Lake Song-Kul
17. Karatal-Japyryk Nature Reserve – Section 2: Karatal River Canyon
18. Karatal-Japyryk Nature Reserve – Section 3: Lake Chatyr-Kul
19. Saimaluu-Tash National Park
20. Kara-Shoro National Park
21. Kyrgyz-Ata National Park
22. Almaty Nature Reserve, Kazakhstan
23. Ile-Alatau National Park, Kazakhstan
24. Aksu-Jabagly Nature Reserve, Kazakhstan
25. Ugam-Chatkal National Park, Uzbekistan
26. Chatkal Nature Reserve – Section 1: Maydantalu, Uzbekistan
27. Chatkal Nature Reserve – Section 2: Bashkizylsaya, Uzbekistan

The following review of protected areas in the Tian Shan and Pamir-Alai Ranges is based on a variety of sources, including project documents, protected area maps, interviews, internet sources, and most importantly the author's personal travels along the Tian Shan in Kyrgyzstan, Kazakhstan, Uzbekistan, and Xinjiang during the 14-month period from September 2003 to November 2004.

Due to the ongoing Global Environment Facility (GEF) - European Union Technical Assistance to the Commonwealth of Independent States (TACIS) joint project that is seeking to obtain UNESCO-MAB biosphere designation for the entire West Tian Shan of Kyrgyzstan, Kazakhstan, and Uzbekistan, the author chose to focus his research efforts on eastern Kyrgyzstan (CATWTSBP 2005). Thus, over the course of this investigation the author visited a total of 14 protected areas in the eastern Kyrgyz provinces of Chu, Issyk-Kul, and Naryn, while a 15th protected area was visited in the Northern Tian Shan of Kazakhstan (Table 11). Consequently, the overviews of these 15 protected areas are the most detailed in this survey. For other regions where protected areas were not visited by the author, brief informational summaries are provided based on the types of sources listed above.

Table 11. Protected Areas Visited by the Author for this Study.

Protected Area	Location	Date of Visit
	I. KYRGYZSTAN	
Ala-Archa National Park	Chu Province	October, 2003; May, August, September, 2004
Chong-Kemin National Park	Chu Province	August 2004
Issyk-Kul Nature Reserve	Issyk-Kul Province	February 2004
Keng-Suu Wildlife Sanctuary	Issyk-Kul Province	April 2004
Teplokluhenka Wildlife Sanctuary	Issyk-Kul Province	March, June 2004
Karakol National Park	Issyk-Kul Province	April, May, June 2004
Jeti-Oguz Wildlife Sanctuary	Issyk-Kul Province	June 2004
Sarychat-Ertash Nature Reserve	Issyk-Kul Province	July 2004
Chong-Jargalchak Wildlife Sanctuary	Issyk-Kul Province	June 2004
Karatal-Japyryk Nature Reserve – Section 1: Lake Song-Kul	Naryn Province	August 2004
Karatal-Japyryk Nature Reserve – Section 2: Karatal River Canyon	Naryn Province	October 2004
Karatal-Japyryk Nature Reserve – Section 3: Lake Chatyr-Kul	Naryn Province	August 2004
Salkyn-Tor National Park	Naryn Province	September 2004
Naryn Nature Reserve	Naryn Province	December 2003, October 2004
	II. KAZAKHSTAN	
Almaty Nature Reserve	Almaty Province	September 2004

A. The Protected Areas of the Eastern Kyrgyzstan Tian Shan

In the three easternmost provinces of Kyrgyzstan, site visits were made to six nature reserves, four national parks, and four wildlife sanctuaries. Findings from these visits are detailed below.

1. Protected Areas of Chu Province

Ala-Archa National Park

Location and Size. Located 30 km (19 mi.) south of Bishkek in the highest section of the Kyrgyz Range, Ala-Archa is Kyrgyzstan's oldest and most visited national park, receiving hundreds of visitors each weekend from May until October (Map 6). The park was established in 1976 and has an area of 194 sq. km (75 sq. mi.) that encompasses the upper watershed of the Ala-Archa River. The total length of the park is about 25 km (16 mi.), of which there is a paved road for roughly the first 10 km (6 mi.) from the entrance gate to the park's small lodge and main picnic and camping area. Entrance fees at Ala-Archa are US \$0.75 per person and US \$1.50 per car.



Ala-Archa National Park, Chu Province.

Terrain. Ala-Archa is centered around the steep mountain canyon of the upper Ala-Archa River. Elevations in the park range from about 1600 m (5200 ft) at the parks entrance to a high point of 4895 m (16,056 ft) on Peak Semenova. The lower part of the park is a classic V-shaped mountain valley, while the upper part is a series of several broad, glacially formed steps set at the bottom of a stunning amphitheater of sheer cliffs and rocky crags topped by dozens of glaciers.

Management. At present, the Ala-Archa administrative headquarters are located in downtown Bishkek, and the park is one of only two protected areas in the country administered directly by the office of the president, rather than the State Forest Service, although this may change with President Akaev's recent ouster. In the fall of 2003, President Akaev signed tentative agreements with the U.S. State of Montana to cooperate on developing a plan to improve park management and facilities, however the status of this agreement following the president's downfall is uncertain (Bairamukova 2004).

Flora. In the lower part of the canyon, just beyond the entrance gate, is a short stretch of forest consisting of introduced trees, such as Siberian larch and non-native birch, after

which the valley is dominated by the sparse juniper forest for which the park is named, “archa” being the Kyrgyz word for “juniper”. Beyond the park lodge, the junipers give way to a narrow belt of nearly pure stands of native Schrenk’s spruce, which occur in an elevation range of about 2100 to 2800 m (6900 to 9200 ft), found primarily on shaded, north facing slopes. Deciduous shrubs occur the entire length of the valley before eventually grading into alpine grasslands above elevations of about 3000 m (9800 ft). In spring and summer the valley is ablaze with wildflowers.

Fauna. Large fauna in the park includes significant numbers of Siberian ibex, and the area is potentially excellent habitat for snow leopard.

Sacred Sites (Kyrgyz: *mazar*). Natural sacred sites in the park include a number of “wishing trees”, essentially sacred trees in the shamanistic tradition of the nomadic cultures of Central Asia, which are heavily tied with cloth strips and are located next to the Ala-Archa River in the vicinity of the park lodge.

Recreational Features. Recreational features at Ala Archa include extensive hiking and climbing routes. One popular trail leads to the Ak-Sai glacier, climbing roughly 1200 m (3900 ft) over 6 km (4 mi.) to a climbers’ hut at the toe of the glacier. An approximately 13 km (8 mi.) long trail leads up the main Ala-Archa Valley from the park lodge to a former ski lodge located on the edge of the ice fields near the southern boundary of the park, passing an abandoned meteorological station about 8 km (5 mi.) up the valley. During the Soviet era, skiers were flown by helicopter directly from Bishkek to the ski lodge. However, the lodge is now abandoned and only accessible on foot, though the building itself is still in good shape and is a popular destination for backpackers who make good use of the deteriorating facilities. It is possible that with some relatively minor repairs and promotion both the ski lodge and the meteorological station could be used as hostels for hikers and climbers during the summer months. Given the large numbers of visitors to the park, these facilities could probably be self-financing, boosting the parks income somewhat, while providing a few summer jobs. Yurt accommodation and a limited number of horses are available for hire in the lower park.

Conservation Issues. Ala-Archa National Park suffers from heavy recreation pressure, including the heavy collection of wood for campfires by both campers and picnickers in the lower park. Another problem is the habit that most young visitors to the park have of picking wildflowers during the spring and summer months, even though a number of wildflower species in the park are rare or endangered. While the park is no longer heavily grazed, Soviet era grazing damage remains. On July 21, 2003, a catastrophic mudslide in the lower park, which in Kyrgyzstan often result from overgrazing, destroyed 25 summer cabins near the park entrance, killing several people (Nichiporova 2003).

Chong-Kemin National Park

Location and Size. The entrance to Chong-Kemin National Park is located about 100 km (62 mi.) east of Bishkek, just off the Bishkek-Naryn Highway. Chong-Kemin was established in 1997 and has an area of 1265 sq. km (488 sq. mi.), making it Kyrgyzstan's second largest protected area, and it is about three and half times the size of the nation's next largest national park (Tables 8 and 9). The park is set between the Kungoy Range and the Zaile Range, which forms the Kyrgyz-Kazakh border, and encompasses almost the entire Chong-Kemin River watershed.



Chong-Kemin National Park, Chu Province.

The total length of the park is about 100 km (62 mi.), of which a paved road runs for approximately the first 20 km (12 mi.) until the last village in the valley, Tegirmenti, after which a maintained dirt road covers the next 40 km (25 mi.) of the park before deteriorating into an unmaintained jeep track.

Terrain. Chong-Kemin is dominated by the broad, gently sloping, meadow-filled valley of the Chong-Kemin River. Elevations in the park range from about 1400 m (4600 ft) near the park's entrance to a highpoint of 4760 m (15,610 ft) on Peak Chok-Tal in the Kungoy Range. The westernmost section of the park is located in the picturesque Chong-Kemin River gorge, which opens up after a few kilometers into a 15 km (9 mi.) stretch of plough land occupied by eight or so farming villages. This heavily inhabited section of the park is of dubious conservation value, but was no doubt "protected" since ex-President Akaev's home village is here, and his mother still resides in the valley. In the eastern half of the park, the slopes of the Kungoy and Zaile Ranges rise steeply from the broad valley floor to glacier fields along their crests.

Management

The entire western half of Chong-Kemin National Park appears to be a giant multi-use zone. Farming villages occupy the first 20 km (12 mi.) of the park, while a number of small, family-run, herding operations, including both permanent houses and yurt camps, occupy the eastern 40 km (25 mi.) stretch of the park road. There also appears to be an active forestry operation working on the north-facing slopes of the Kungoy range over this same 40 km (25 mi.) stretch of the park.

The park's administrative offices and visitor center are located in Tort-Kul, a farming village located inside the park, about 14 km (9 mi.) from the Bishkek-Naryn highway. Chong-Kemin is one of only two national parks in Kyrgyzstan that is administered directly by the office of the president, rather than the state forest service, the other being Ala-Archa, discussed above. At present there is no entrance gate and no one collecting entrance fees, although there is a park sign. On the day the author visited, our vehicle was

stopped 60 km (37 mi.) inside the park by rangers who informed us that if we wished to visit the park we would first need to obtain permission directly from President Akaev's office in Bishkek, or alternatively we could purchase a tour from the park's lone resort hotel in the village of Kaiyndy, which no doubt received its concession directly from the president. These park regulations will, in all likelihood, change now that President Akaev has resigned his office.

Flora. Flora in the Chong-Kemin Valley is dominated by the extremely productive grasslands that occur throughout the park, particularly east of the farming areas. However, near the last group of villages, a narrow belt of forest begins which occupies north facing slopes of the Kungoy range between elevations of about 2200 and 2800 m (7200 and 9200 ft). In the vicinity of the village of Tegirmenti, this tree belt includes introduced species of pines and birches that were planted by the local forestry collective, however in the middle and eastern sections of the park, the forest belt consists solely of pure stands of Schrenk's spruce before tree cover ends all together at the eastern end of the park, where the Kungoy and Zaile Ranges merge.

Fauna. Fauna at Chong-Kemin is said to include snow leopard, Eurasian lynx, brown bear, Siberian ibex and elk, as well as trout in the Chong-Kemin River.

Recreational Features. Recreational possibilities at Chong-Kemin include horseback riding and fishing in the Chong-Kemin River. The tourist hotel in Kaiyndy can supposedly arrange horses, guides, and yurts, and probably hunting and fishing trips as well. However, by far the most popular activity among westerners visiting the park is undertaking the several day trek from Lake Issyk-Kul to Almaty, the former Kazakh capital. Routes through the park can be taken which cross any of six passes in the Zaile Range, which forms both northern boundary of the park and the international border. From all accounts, there is no one patrolling the park's trekking routes between Lake Issyk-Kul and Kazakhstan, and hikers are asked for neither entrance fees nor presidential permission.

Conservation Issues. The park is well-known for being frequently visited by armed Kazakh cattle rustlers, who drive livestock from the Chong-Kemin Valley over the mountain into Kazakhstan. It is believed that these same parties also poach endangered wildlife in the area.

2. Protected Areas of Issyk-Kul Province

Issyk-Kul Nature Reserve (*Zapovednik*)

Location and Size. Lake Issyk-Kul is located 175 km (110 mi.) by road east of Bishkek, and with an area of 6236 sq. km (2408 sq. mi.), Issyk-Kul is one of the world's largest lakes. The maximum dimensions of Lake Issyk-Kul are: length 178 km (111 mi.), width 60 km (37 mi.), and depth 668 m (2191 ft), while the lake's



Stream estuary formed by rising lake level near the village of Ananevo, Lake Issyk-Kul.

shoreline has a total length of 669 km (416 mi.) (Savvaitova 1999). However, only a small portion of the lake is protected in the Issyk-Kul Nature Reserve. The reserve, Kyrgyzstan's oldest protected area, was established in 1948 and has a total area 190 sq. km (73 sq. mi.) divided into 10 non-contiguous sections distributed around the lake. These sections include lakeshore, wetlands, and open water, and were selected with the primary objective of protecting the wintering grounds of a number of waterfowl species.

Terrain. Lake Issyk-Kul is located at an elevation of 1608 m (5274 ft). The lake is ringed by mountains, with the Kungoy Range, maximum elevation 4771 m (15,650 ft), running the entire length of the northern lake basin, while the Terskey Range, maximum elevation 5216 m (17,110 ft), dominates the south side of the lake. There are 102 rivers and streams that flow into the lake basin, many of which no longer reach the lake due to being diverted for irrigation. Above 3300 m (10,800 ft) these rivers are fed by primarily by meltwater of the extensive snow and glacier fields in these two ranges (Savvaitova 1999). The lake has no outlet and is slightly saline, although the Chu River, which passes within 7 km (4.5 mi.) of the lake's western tip, once drained the lake during a wetter climactic epoch (Konurbaev 2003, Savvaitova 1999). All terrestrial sections of the nature reserve lie on the immediate shore and coastal plain of the lake.

Management. The administrative headquarters of the reserve are located in the town of Ananevo, about 250 km (155 mi.) east of Bishkek on the north shore of the lake, where there is a small office and visitors' center with a nature museum.

Flora. Plant life in the reserve is dominated by shrublands and reedy wetlands, with the two most prominent species being reeds (*Phragmites communis*) and sea buckthorn (*Hippophae rhamnoides*), both of which have high habitat value for the rich animal life of the lake basin. There is also limited forest cover in some of the eastern sections of the reserve.

Fauna. Waterfowl inhabiting the reserve include the whooper swan (*Cygnus cygnus*), mute swan (*Cygnus olor*), common pochard (*Aythya ferina*), and the common coot (*Fulica atra*). Other species resident in the reserve include important game species, such as pheasant (*Phasianus colchicus*) and wild boar, as well as a number of predators including wolf, red fox, and an increasing number of golden jackals (*Canis aureis*) which first entered the Lake Issyk-Kul basin in 1980 (WI 2005, Hazell 2003).

Sacred Sites. There are numerous natural sacred sites scattered throughout the Lake Issyk-Kul basin, including springs, groves, outcrops, waterfalls, and hillocks, as well as a number of cultural sacred sites, such as tombs and petroglyphs (Dompke 2004, Ulemann 2003).

Recreational Features. Surrounded by soaring peaks capped with snow and glacier fields but having warm summer weather and beautiful beaches, Lake Issyk-Kul is the Central Asian Riviera, attracting thousands of beachgoers each summer from all over Central Asia and the former Soviet Union. It is far and away Kyrgyzstan's single most important tourist attraction. The north shore of the lake was heavily developed for tourism during the Soviet era, at which time numerous beach front resort hotels were built, and presently Chinese business interests are negotiating to build a large resort complex on the southeast shore of the lake that will cater to Chinese tourists (see Part III, Section A, Subsection 3, "Fences and Highways", pg. 43 above).

While by design the Issyk-Kul Nature Reserve is for the preservation of lake and lakeshore ecosystems, and therefore closed to public visitation, with the large numbers of tourists visiting the lake each summer there is clearly a great potential for conducting guided eco-tourism activities at various sections of the reserve. While the primary recreational activities at Lake Issyk-Kul will remain sunbathing and swimming at the area's numerous beach resorts during July and August, guided birding and bird photography trips, both on foot and by boat, could be a large draw for the increasing numbers of western tourists who visit the lake each year, and is potentially an important source of revenue for funding operation of the reserve.

Conservation Issues

The Issyk-Kul Nature Reserve is important not only as both a summer nesting and wintering ground for waterfowl, but also because it is an important stopover for migratory birds flying between North and South Asia. However, at present many environmental problems plague the reserve and Lake Issyk-Kul in general. The lake once had a commercially important fishery which has yet to recover from Soviet-era mismanagement, with several native fish species having disappeared due to a combination of overfishing and stocking of aggressive, non-native fish (Savvaitova 1999, Konurbaev 2003).

The reserve is highly fragmented, and each section is small, poorly patrolled, and not effective in its objective of preserving lakeshore habitat. At present a number of sections of the reserve are used largely as commons by villagers of the densely populated lakeshore area, who use reserve territory for grazing sheep and cows, cutting of wood and

brush for fuel, and for hunting wild game. Effective enforcement of reserve regulations is not possible at this time due to the lack of adequate funding and equipment for rangers.

Keng-Suu Wildlife Sanctuary (*Zakaznik*)

Location and Size. The Keng-Suu Wildlife Sanctuary is located, about 40 km (25 mi.) east of the northeastern corner of Lake Issyk-Kul, just above the village of Keng-Suu on the southern slope of the Kungoy Range. The sanctuary has an area of 87 sq. km (34 sq. mi.) and was established in 1990. The reserve is roughly 20 km (12 mi.) long and 4.5 km (3 mi.) in width.



Keng-Suu Wildlife Sanctuary, Kungoy Range,
Issyk-Kul Province.

Terrain. Terrain in the reserve consists almost entirely of steep, south facing mountain slopes and ravines, which in places are broken by rocky outcrops. Elevations range from 2000 m (6600 ft) behind the village of Keng-Suu to about 3200 m (10,500 ft) along the crest of the Kungoy Range, which forms the international border with Kazakhstan.

Management. There are no signs notifying visitors that they are in a wildlife sanctuary, and there are not even border markers or army border patrols to be found along the Kazakh border atop the Kungoy range on the sanctuary's northern boundary. The lower part of the sanctuary is home to a working forestry collective, which operates tree nurseries and has afforested numerous slopes within the reserve with introduced tree species. Lower meadows in the sanctuary are extensively grazed by livestock kept in the seven villages that lie on the southern boundary of the sanctuary. The author was unable to locate the sanctuary ranger.

Flora. Flora in the reserve consists of a mix of forests and meadows. Lower forests are composed of introduced species of larch, birch, and pine planted by the local forestry collective, while upper forests are pure stands of indigenous Schrenk's spruce. Lower meadows are well-watered, while forests give way to windswept alpine meadows along the ridgecrest at elevations above 3000 m (9800 ft).

Fauna. Notable fauna observed in the sanctuary consisted of several large raptor species and the Turkestan salamander (*Hynobius turkestanicus*). Wolf spoor was observed above the village of Keng-Suu.

Recreational Features. According to locals, visitation at the sanctuary amounts to two or three foreign visitors annually, who generally hire horses to visit a tiny mountain lake

located above the village of Keng-Suu, a two or three-hour horse ride away. Potential recreation activities at the reserve include horseback riding, hiking, camping, and birding.

Conservation Issues. While higher pastures are little used, pastures in the immediate vicinity of the village of Keng-Suu are severely overgrazed resulting in erosion, severe gullyng, and several large slope failures near the village. The entire sanctuary is easily accessible on foot from seven different villages, so poaching of wildlife is no doubt a problem at the reserve.

Teplokluchenska Wildlife Sanctuary (*Zakaznik*)

Location and Size. The Teplokluchenska Wildlife Sanctuary is located, about 20 km (12 mi.) by road southeast of the Issyk-Kul provincial capital of Karakol, just above the district center of Ak-Suu (formerly Teplokluchenska). The sanctuary was established in 1972 for the protection of roe deer, snow leopard, and other game species, and has an area of area of 290 sq. km (112 sq. mi.) centered around the 30 km (19 mi.) long Arashan River valley, which lies on the north slope of the Terskey Range. An extremely rough, 10 km (6 mi.) long logging road extends up the Arashan Valley from the sanctuary entrance to the small settlement of Altyn-Arashan.



Teplokluchenska Wildlife Sanctuary, Arashan Valley, Issyk-Kul Province.



Glaciers and cascading ice, north slope of the Terskey Range, Teplokluchenska Wildlife Sanctuary, Issyk-Kul Province

Terrain. Terrain in the Teplokluchenska sanctuary is typical of that in nearly all of the forested valleys on the north slope of the eastern Terskey Range, which are renowned for their extremely Alp-like scenery. The Arashan Valley rises steeply from an elevation of about 1900 m (6200 ft) at its mouth to a maximum of about 4700 m (15,400 ft) in the ice fields atop the crest of the Terskey Range. The lower half of the sanctuary consists of a deep, narrow, V-shaped river valley punctuated by numerous avalanche chutes, while the upper half of the Arashan Valley is composed of several

broad glacial steps that end in moraine fields at an elevation of about 3200 m (10,500 ft). The valley reaches its terminus in a series of dramatic icefalls flowing northward off the crest of the Terskey Range.

Land-Use History. Prior to the founding of the Soviet Union, exploitation of the native spruce forests in the Arashan Valley was extremely limited, since the Kyrgyz did not build houses at this time and preferred willow for building yurt frames. After the Russian revolution, from 1925 to 1947 the valley was designated a “production forest” (ru: *lespromkhoz*), and was heavily logged with no afforestation efforts made. The steep mountain slopes in the valley were clear cut, which led to chronic erosion, slope failures, and siltation of the Arashan River. In 1947 the production forest was reorganized as the Przhhevalski Forestry Collective (ru: *leskhoz*), at which time the first afforestation program was begun. In 1956 part of the valley began to be used as an experimental forestry station by the Kyrgyz Academy of Sciences, while in the late 1990’s, under the tutelage of a Kyrgyz-Swiss forestry support program, the now renamed Ak-Suu Forestry Collective was reorganized as the Ak-Suu Forest District (ru: *lesnichestvo*), which seeks to reorient the goals of the forestry operation from purely timber production oriented management to a management regime that seeks to maintain ecological balance in the valley as well as timber production.

In a related historical note, in 1932 the first tree nursery in Kyrgyzstan was established in the nearby town of Ak-Suu (formerly Teplokluchenka) with Scotch pine (*Pinus sylvestris*) and Siberian larch (*Larix sibirica*) introduced from the Krasnoyarsk area of central Siberia.

While the lower Arashan Valley was the center of forestry operations in the area, the upper valley was used as summer pasture for the local herding collective. At the peak of Soviet wool production in the late 1980s, up to 42,000 sheep were pastured in the Arashan valley for four months each year from about May 15th to September 15th (see Appendix A, section on the Zaria Cooperative). Today, the upper half of the valley continues to be used as summer pasture for about 5000 sheep.

Management. Areas planted with introduced tree species are restricted to the lower quarter of the valley, and a fairly large logging operation is still active in various side valleys of the lower Arashan. The extensive meadows of the upper valley are prime summer pastures that are occupied by both individual herders and members of the Ak-Suu based Zaria Cooperative. Pasture leases are granted by the local forest district on a five to ten year basis.

While the main entrance to the sanctuary is signed, the two major trekking routes entering the sanctuary from the east and the west are not signed. Supposedly there is a ranger who patrols the sanctuary, however the director of the forest district, whose office is at the main entrance to the sanctuary, did not know who held this post.

Flora. The lower valley slopes have been planted with introduced species of pine, spruce, larch, and birch, while the forests of the middle valley are comprised of pure stands of

Schrenk's spruce. Well-watered valley bottom meadows occupy the upper half of the valley with rich assemblages of wildflowers blooming from June to August. Tree line occurs at about 3000 m (9800 ft) in elevation.

Fauna. Until recently, wildlife in the Arashan Valley had included snow leopard, brown bear, Pallas's cat, Siberian ibex, and elk, although many if not all of these species are no longer present in the sanctuary, having been eliminated by overhunting in spite of the valley's protected status as a wildlife sanctuary. However, the exact status of wildlife in the valley has not been determined in recent years.

Recreational Features. The Arashan Valley is one of the most visited trekking destinations for western tourists in Kyrgyzstan, and is also the site of a small series of mineral baths that are extremely popular with the local Russian population. Short, two to seven day treks can be started in the Teplokluchenka wildlife reserve that take in the extremely scenic Ak-Suu Valley to the east or the equally stunning Karakol National Park and Jeti-Oguz Wildlife Sanctuary to the west. Each of these valleys is forested and features fantastic Alp-like views of snowcapped spires and icefields. Other recreational possibilities include climbing expeditions along the crest of the Terskey Range, horseback riding, and day hikes. Dormitory style accommodation is available at the mineral springs in the small settlement Altyn Arashan, and from two tour operators who maintain cabins at Altyn Arashan. The lower valley is also a popular weekend picnic destination for inhabitants of the town of Ak-Suu.

Conservation Issues. Acute problems of clear-cutting and overgrazing appear to have largely ended with the demise of the Soviet Union, however slope instability resulting from prior damage may still be an issue. The valley is under increasing recreation pressure from the dozens of people who make the 10 km (6 mi.) walk or jeep ride from the sanctuary entrance to the mineral springs at Altyn Arashan. By all accounts, poaching of wildlife in the valley is rampant, although it now appears that there is little wildlife left to poach.

Karakol National Park

Location and Size. The main entrance gate of Karakol National Park is located about five kilometers (3 mi.) south of the town of Karakol. The park was established in 1997 and has an area of 381.0 sq. km (147 sq. mi.) centered around the forested, 30 km (19 mi.) long, Karakol River valley. The park road is about 17 km (11 mi.) long, of which the first two kilometers are paved as far as the forestry collective village within the park, while the



Glaciers and glacial outwash plain, Terskey Range, Karakol National Park, Issyk-Kul Province.

next four unpaved kilometers are still navigable by car. The remaining 11 km (7 mi.) are a rough logging road that require a jeep or truck, but which are impassable much of the year due to avalanches. Park entrance fees are US \$1.25 per person for Kyrgyz citizens or US \$5.00 per person for foreign visitors.

Terrain. The terrain and land cover in the park are very similar to those of the adjacent Teplokluchenska Wildlife Sanctuary, described above. Elevation ranges from about 1900 m (6200 ft) at the mouth of the Karakol Valley to a maximum of 5216 m (17,110 ft) on the crest of the Terskey Range just beyond the park's southern boundary. The lower Karakol Valley is a narrow, forested, steeply plunging, V-shaped valley, while the upper valley is a series of broad flat glacial steps separated by precipitous cascades. The main valley ends at the toe of a short glacier with dramatic icefalls and snowfields above.

Land-Use History. Up until 1889, the Karakol River valley was relatively undisturbed. However, in that year, with the need for timber to build the rapidly expanding Russian garrison town of Karakol, logging operations began in the lower valley which removed much of the original forest cover of Schrenk's spruce. After the Russian revolution, the timbering operation was reorganized as a production forest (*lespromkhoz*), which was essentially a clear-cutting operation that did not replant forests. In 1948, the production forest was reorganized as a forestry collective (*leskhoz*), and afforestation work began for the first time, which, in the great Soviet tradition of making the land more "economically productive", included introduction of numerous non-native species of pine, spruce, larch, birch, and poplar from European Russia, Siberia, the Caucasus, and North America. In 1997 the Karakol Valley was declared a national park.

In addition to forestry operations, throughout the Soviet period the meadows in the upper half of the valley were used as summer pastures for sheep and other livestock for four to six months of the year. At the end of the late 1980s, 5000 sheep and hundreds of cows and horses were pastured in the valley (see Appendix A, section on the Karakol Valley).

Zoning and Management. Karakol National Park is divided into three zones as follows:

1. The "production zone", with a total area of 4246 ha (10,490 acres), or about 11 percent of the total park area, is where tree plantations are located and slope-side afforestation projects are conducted. Logging and grazing activities also occur in the production zone.
2. The "recreation zone", which has a total area of 14,480 ha (35,770 acres) or 39 percent of total park area, where camping, hiking, horseback riding, picnicking, etc. are permitted.
3. The "prohibited zone" has a total area of 18,970 ha (46,860 acres), or 50 percent of the park's total area, which is nominally closed to the public for the protection and preservation of wildlife and ecosystems.

The park's administrative offices are located in the town of Karakol, and the park employs seven rangers and an additional 30 people to run the forestry operation in the

lower park, including managing the park's tree nurseries, preparing land for afforestation efforts, and actual planting of trees. Park rangers receive a salary of about US \$17 per month and are responsible for providing their own horses, while the park administration owns one Russian jeep.

About 60 people reside permanently in the park, in the small forestry collective village at the end of the park's paved road, who are, for the most part, forestry workers and their families who look after the park's tree nurseries. Even though a national park, a logging operation is still active in the Karakol Valley, with trees being felled about 15 km (9 mi.) from the park entrance at the time of the author's visit. The meadows in the upper half of the park continue to be occupied from mid-April to mid-October by about 20 herders, who altogether manage roughly 2000 sheep and 500 horses and cows, which are pastured right up to the toe of the glacier at the top of the main valley (see Appendix A).

In the lower part of the park, for two or three kilometers past the park entrance, there is an unlined Soviet-era irrigation ditch above the road which provides a limited amount of water to the farming village just outside the park entrance.

Flora. Forests cover about 4800 hectares (11,860 acres) of the park, or 13 percent of park territory, of which 1600 ha (3950 acres) have been planted, primarily with introduced species, while the remainder are predominantly pure stands of native Schrenk's spruce. The current plan is to afforest 20 ha (49 acres) of the park with introduced tree species each year for the indefinite future. Well-watered valley bottom meadows occur throughout much of the park, and above 3000 m (9800 ft) forests give way to alpine meadows.

Introduced tree species in the park include Siberian pine (*Pinus sibirica*), Crimean pine (*Pinus nigra*, ssp. *pallasiana*), Scotch pine (*Pinus sylvestris*), Siberian larch (*Larix sibirica*), as well as various introduced species of spruce, birch, and poplar. In addition to Schrenk's spruce (*Picea schrenkiana*), other important native trees and shrubs found inside the park include mountain ash (*Sorbus tianshanica*), the junipers *Juniperus serafshanica*, *Juniperus turkestanica*, and *Juniperus semiglobosa*, as well as sea buckthorn (*Hippophae rhamnoides*), various hawthorns (*Crataegus* spp.), honeysuckle (*Lonicera* spp.), cherry plum, (*Prunus cerasifera*), and wild rose (*Rosa canina*). The higher areas of the parks are dominated by a variety of valley bottom and upland meadow ecosystems.

Fauna. The park provides habitat for many threatened mammals such as the snow leopard, Pallas's cat, Eurasian lynx, and the Tien Shan brown bear, as well as having significant populations of Siberian ibex and eastern roe deer. Birds resident in the park include such notable species as the Himalayan snowcock, golden eagle, and Egyptian vulture (Table 12).



Grey marmot
(*Marmota baibacina*).

Sacred Sites. The most important sacred site within the park is a spring near the park entrance on the west bank of the Karakol River.

Table 12. 2003 Mammal and Bird Count, Karakol National Park*

Common Name	Latin Name	Count
Mammals		
Tien Shan brown bear	<i>Ursus arctos isabellinus</i>	8
Snow leopard	<i>Uncia uncia</i>	4
Eurasian lynx	<i>Lynx lynx</i>	3
Grey wolf	<i>Canis Lupus</i>	17
Red fox	<i>Vulpes vulpes</i>	28
Squirrels	<i>Sciuridae</i>	45
Rabbits and hares	<i>Leporidae</i>	111
Siberian ibex	<i>Capra sibirica</i>	440
Eastern roe deer	<i>Capreolus pygargus</i>	90
Wild boar	<i>Sus scrofa</i>	25
Ermine/Stoat	<i>Mustela erminea</i>	31
Pallas's cat/Manul	<i>Felis manul</i>	12
Grey marmot	<i>Marmota baibacina</i>	91
Stone marten	<i>Martes foina</i>	8
Muskrat	<i>Ondrata zibethicus</i>	35
Birds		
Pheasant	<i>Phasianus colchicus</i>	61
Himalayan snowcock	<i>Tetraogallus himalayensis</i>	27
Daurian partridge	<i>Perdix dauuricae</i>	52
Falcons	<i>Falco spp.</i>	4
Golden eagle	<i>Aquila chrysaetos</i>	5
Hawks	<i>Accipitridae</i>	6
Egyptian vulture	<i>Neophron percnopterus</i>	12
Crows and Ravens	<i>Corvus spp.</i>	360
Starlings	<i>Sturnidae</i>	150
Black-billed magpie	<i>Pica pica</i>	90
Owls	<i>Asio spp.</i>	25
Eurasian cuckoo	<i>Cuculous canorous</i>	10
Northern black grouse	<i>Tetrao tetrix</i>	11
Pigeons	<i>Columbae</i>	420
Sparrows	<i>Passeriformes</i>	52

Source: Karakol National Park Administration

*Note: Counts presented here are the composite counts of numerous observers and include both animals resident in Karakol National Park as well as animals transiting the park's territory. Therefore the actual population of any given species in the park may be significantly lower than the figure given.

Recreational Features. Due to its convenient location on the outskirts of the provincial capital, Karakol National Park is a popular place with locals for weekend picnics and barbecues, and in 2003 over 4700 people visited the park (Table 13). Picnic tables and barbecue sites are located about six kilometers from the park entrance gate, and fill up quickly on Saturdays and Sundays in summer. There are also a few yurts set up in the lower park that function as tea houses and cafes for visitors. Camping is possible.

At the end of the 17 km (11 mi.) long park road, several herding camps are clustered together at a point where three extremely scenic hiking trails converge. Immediately due south of the trail junction is an approximately 12 km (7 mi.) long trail that leads to the climber's base camp for the ascent up Mt. Yeltsin (elevation 5216 m/17,110 ft), which was a popular climb during Soviet times. A number of plaques have been placed along the trail in memory of climbers who perished during the ascent. The trail ends at the glacier fields of the Terskey Range.

East from the end of the jeep track is the trail to the Teplokluchenka Wildlife Sanctuary via the picturesque Lake Ala-Kul, which is set just below the pass to the Arashan Valley. Lake Ala-Kul is a three kilometer long glacial lake ringed by cliffs and sheer scree slopes which remains frozen for about nine months of the year. A wooden hikers' hut with established tent sites is located halfway to the lake. West from the end of the jeep track is a third trail leading over a spur of the Terskey Range to the Jeti-Oguz Wildlife Sanctuary, which is the subject of the next section.

In addition to being a popular hiking, climbing, and daytrip destination, the park also has a small ski-run with rope tow that operates during the winter months.

Table 13. 2000-2003 Karakol National Park Visitor Count

Year	Foreign Visitors	Kyrgyz Visitors	Total
2000	156	1568	1724
2001	282	1609	1891
2002	127	2787	2914
2003	147	4580	4727

Source: Karakol National Park Administration

Conservation Issues. Conservation issues at the park are varied, and include the usual lack of money to provide rangers with adequate salaries, transportation, and equipment, as well as poaching of wildlife and the illegal cutting of young evergreens for sale as Christmas trees. In spite of its national park status, the Karakol Valley is still actively logged and fairly intensively grazed. Several herders in the valley were seen riding with rifles slung over their shoulders during the author's visit, presumably as defense against wolves, but inviting the temptation to shoot other wildlife for a change of diet. While the park does have three designated zones, there are no signs indicating the boundaries of any of these zones, and on the main trekking routes leading into the park there are no signs posted indicating the park boundary or regulations.

Fortunately, no major forest fires have occurred in living memory in the Karakol Valley, although recently a small fire destroyed 0.6 ha (1.5 acres) of forest. Although fires are only permitted in designated campsites, there are no signs posted with reference to this regulation, and it does not appear to be rigidly enforced.

Jeti-Oguz Wildlife Sanctuary (*Zakaznik*)

Location and Size. The Jeti-Oguz Wildlife Sanctuary is located about 30 km (19 mi.) by road to the southwest of Karakol. The sanctuary was established in 1958, has a total area of 300 sq. km (116 sq. mi.), and was founded for the protection of large game species such as brown bear, elk, roe deer, and wild boar. The valley is about 30 km (19 mi.) in length, and a dirt logging road extends about halfway up the valley.



The Seven Bulls sandstone outcrops, Jeti-Oguz Wildlife Sanctuary, Issyk-Kul Province.

Terrain. The Jeti-Oguz River valley is extremely similar to the adjacent Karakol and Arashan River valleys, discussed above, with the lower half being a forested V-shaped river valley while the upper half is series of broad, glacially formed steps that grade into moraine fields before the valley ends at an ice fall descending a peak of the Terskey Range. Elevation in the sanctuary ranges from about 2000 to 5100 m (6600 to 16,730 ft).

Land-Use History. The Soviet-era land-use history of the Jeti-Oguz valley is nearly identical to that of the Arashan and Karakol Valleys, discussed above. Prior to 1947, the valley had been designated a production forest (*lespromkhoz*), which involved clear-cutting of native spruce with no afforestation efforts. In 1947, the operation was reorganized as a forestry collective (*leskhoz*), and an active afforestation program began using the same species of introduced trees as in the Arashan and Karakol valleys, such as non-native pine, spruce, larch, poplar, and birch.

During the period following the Second World War, the meadows of the upper Jeti-Oguz Valley were occupied by the sheep of the Issyk-Kul Collective Farm (ru: *kolkhoz*), the Shevchenko Collective Farm, and the Rodko State Farm (ru: *Sovkhoz*). At the peak of the collective era in 1989, these three herding collectives combined grazed about 50,000 sheep and 2000 horses and cows on summer pastures in the valley.

Management. The Jeti-Oguz Forestry Collective (*leskhoz*) is quite large, managing a fairly continuous, roughly 90 km (55 mi.) long, belt of forest that extends along the north slope of the Terskey range from the village of Jeti-Oguz in the east to the south lakeshore

town of Tosor in the west, of which the Jeti-Oguz Wildlife Sanctuary is only a small part of this territory. At present, there are 537 ha (1330 acres) of land in the sanctuary that is afforested with introduced tree species, while there is an overall goal of afforesting 26 ha (64 acres) per year in the valley. At present, all tree nurseries and areas planted with introduced species of trees are confined to the lower valley, within a radius of several kilometers south of the Jeti-Oguz mineral spa. Logging operations in the sanctuary are presently limited to the lower half of the valley by the current extent of the valley jeep road.

Today, only about 2000 sheep and 2000 horses and cows are pastured in the valley during the summer months, which are overseen by about 30 herders. The staff of the Jeti-Oguz Forestry Collective estimate that around 180 sheep were lost to wolf kills in the sanctuary in 2003.

Flora and Fauna. Native flora and fauna as well as introduced tree species in the Jeti-Oguz Valley are fairly identical with those found in the neighboring Karakol National Park and Teplokluchenka Wildlife Sanctuary, discussed above. Notably, the Jeti-Oguz sanctuary is said to be home to an estimated 200 to 300 Siberian ibex.

Sacred Sites. Sacred sites are abundant in the Jeti-Oguz area, and include the Seven Bulls rock outcrop, the adjacent Broken Heart Rock, the main mineral spring above the spa village, and various other springs and trees in the valley.

Recreational Features. The Jeti-Oguz mineral spa complex, which is located at the entrance to the sanctuary, is a popular vacation destination for Kyrgyz and other citizens of the former Soviet Union. The Soviet-era facilities include a hotel, dining hall, mineral baths, and entertainment facilities, such as a dance hall. The spa complex is built within sight of what is perhaps the Kyrgyz Republic's most famous natural monument, the "Seven Bulls" sandstone outcrops, which bear a strong resemblance to the red sandstones of the canyonlands of the southwest United States. The meadows around these scenic outcrops are an extremely popular spot for weekend picnics, barbecues, and day hikes into the hills.

Several kilometers inside the sanctuary are a few, small, family-run yurt camps catering to tourists that provide meals and accommodation and hire out horses and guides. Trails lead to dramatic views of the Terskey Range at the top of the valley, a two to three day roundtrip hike, or one continue over a spur of the Terskey Range and descend into Karakol National Park.

Conservation Issues. The most visible conservation issue at Jeti-Oguz is the uncontrolled development immediately in front of, the Seven Bulls sandstone outcrops, which severely detracts from one of the nation's most well-known natural wonders. At the time of the author's visit in the summer of 2004, a large, multiple-story building, presumably a new resort hotel, was being built immediately at the base of the red sandstone cliffs, the very symbol of Kyrgyzstan's natural heritage. Other problems include the admitted lack of enforcement of the hunting ban in the reserve, and what

appeared to be the construction of a large, truck-worthy, log bridge midway up the valley, apparently to expand logging operations into the native spruce forests of the upper valley.

Sarychat-Ertash Nature Reserve (Zapovednik)

Location and Size. Sarychat-Ertash Nature Reserve was founded in 1995 for the protection of the high-altitude ecosystems and wildlife of the Inner Tian Shan, particularly the snow leopard and its prey species. With a total area of 1341 sq. km (518 sq. mi.), Sarychat-Ertash is the largest protected area in Kyrgyzstan and one of the largest protected areas in the entire Central Asia region. Sarychat-Ertash is located amongst the high tundra plateaus, or syrtlands, south of the eastern Terskey Range, roughly midway between Karakol and the Chinese Border. The reserve encompasses almost the entire Ertash River basin, as well as small portions of the upper Ak-Shirak River watershed.



Siberian Ibex, Sarychat-Ertash Nature Reserve, Issyk-Kul Province. Photo by Alexander Vereschagin.

Access to the reserve is extremely difficult, but is possible by two routes, either via horseback from the enormous open-pit Kumtor Gold Mine, which sits on the reserve's western boundary and is serviced by an excellent road, or via the rapidly disappearing road to the village of Ak-Shirak, located south of the reserve (Map 8). The journey to Ak-Shirak is an eight-hour jeep ride, weather permitting, through a military "border zone", which requires completion of a lengthy and rather whimsical permitting process



Tundra Bogs, source of the Syr Darya, Sarychat-Ertash Nature Reserve, Issyk-Kul Province.

involving submission of letters of application to the Kyrgyz national intelligence agency, national police service, and army border patrol.

Terrain. Elevations in the reserve range from about 2500 m (8200 ft) at the mouth of the Ertash River to a maximum of 5125 m (16,810 ft) in the icefields of the Ak-Shirak Range. The reserve has an entirely treeless landscape that includes the second-most extensive icefields in Kyrgyzstan, atop the Ak-Shirak and Koyluu Ranges; high tundra plateaus; the deep, plunging river gorges of the Ertash River and its tributaries; and numerous mountain peaks.

Land-Use History. The southwest corner of Sarychat-Ertash is located about 15 km (9 mi.) from one route of the ancient Silk Road, which crosses over the Kakshaal Range from Xinjiang via the 4284 m (14,050 ft) high Bedel Pass en route to the town of Barskoon on the south shore of Lake Issyk-Kul. The territory of the reserve has a long history of human occupation, as is evidenced by the numerous tomb mounds of uncertain origin that can be found scattered throughout the reserve, although it is unlikely that the remote area ever supported more than a sparse population of isolated herding groups.

Following the Second World War, however, improved roads were built into the remote area to support the tin mine at Uch-Korgon, located just outside the reserve's southern boundary. In the late 1960s, numerous herding camps with permanent structures were built along the Ertash and Ak-Shirak Rivers to support a Soviet drive to increase wool production. In the late 1980s, the Ertash River valley was occupied year round by about 40 herders from two different collectives who oversaw roughly 25,000 sheep, 2500 yaks, and 250 horses in the 80 km (50 mi.) long river canyon, while in the Ak-Shirak Valley, south of the reserve, another collective managed 50 herding camps with 30,000 sheep (see Appendix A, section on the Ak-Shirak and Ertash Valleys).

Following independence in 1991, all state support for herding collectives ended, and the collectives on the territory of the reserve disbanded. Apart from 20 families living at the now closed Uch-Korgon mine, and an additional four families in the nearby village of Ak-Shirak, all herders on the territory of the reserve left with their animals and returned to their home villages on the south shore of Lake Issyk-Kul. With the establishment of the Sarychat-Ertash Nature Reserve in 1995, the last herders in the Ertash Valley were relocated, and the entire river basin is now being allowed to revert to wilderness.

Zoning and Management. The reserve is divided into two zones, a core zone and a buffer zone, which, like all nature reserve buffer zones in Kyrgyzstan, is actually an integral part of the reserve, rather than just being adjacent to the reserve. The core zone has an area of 721 sq. km (278 sq. mi.) that is centered around the upper Ertash River basin and nominally closed to all visitation except for rangers and scientific research expeditions. The total area of the reserve's buffer zone is 620 sq. km (239 sq. mi.), which is divided into two sections, a narrow section covering the eastern most 30 km (19 mi.), of the Ertash River valley, and a second section lying in the upper Ak-Shirak watershed that forms the southern-most lobe of the reserve. The reserve's buffer zones function as protected, multi-use areas, which are used primarily by reserve rangers for subsistence

grazing of sheep, cows, and horses. Limited visitation in these buffer zones is permitted by protected area regulations.

The parks administrative headquarters and small visitor center are located in the town of Barskoon, some 175 km (110 mi.) by road from the park's field base near the settlement of Ak-Shirak in the reserve's southern buffer zone. The reserve employs 14 rangers, the majority of whom reside in the communities of Uch-Korgon and Ak-Shirak, or in isolated shepherds' houses along the reserve's boundaries that were constructed by the Soviet-era herding collectives

Flora. Thus far, 180 species of plants have been identified in the treeless high-altitude terrain of Sarychat-Ertash, including many species of grass, several artemisia species, and 15 species of shrubs. Three very generalized categories of plant ecosystems in the reserve are tundra cushion plant communities, wet meadows, and arid grasslands (Zlotin 1997).

Fauna. Animal life in the reserve is abundant, with argali and Siberian ibex populations having rebounded rapidly following the departure of the herding collectives. Being extremely geographically isolated, the reserve serves as some of the most vital habitat for the perpetuation of argali, Siberian ibex, snow leopard, and Pallas's cats in the Tian Shan. The results of the 2003 survey of wildlife at Sarychat-Ertash, are compiled in Table 14, below.



Winter kill, Siberian ibex, Sarychat-Ertash Nature Reserve, Issyk-Kul Province.

Sacred Sites: There are numerous pre-Soviet tomb mounds of undetermined age scattered throughout the reserve, however none is presently considered sacred. All knowledge of sites held sacred within the territory of the reserve has been lost with de-population of the area, first during the process of collectivization in the 1920s and 1930s, and more recently through the process of de-collectivization during the 1990s.

Recreational Features. While officially the core zone of the reserve is closed to all visitation, because of the dire state of the reserve's funding, the staff is exploring the possibility of opening the reserve to limited, guided, eco-tourism activities. It is hoped that in doing so, more revenue will be generated for improved management of the reserve and increasing awareness of conservation efforts in the Inner Tian Shan. Because of the rapid and nearly complete manner in which the territory in and around Sarychat-Ertash was de-populated during the 1990s, the reserve is now the premiere place in the Tian Shan to view large numbers of argali and ibex. Thus ranger led horse treks to view and photograph wildlife are one possibility, with tourists being accommodated in the numerous cabins built in the Ertash River canyon by the Soviet-era herding collectives. In 2003, no tourists visited the reserve, although several foreign scientists and conservation NGO workers did.

Table 14. 2003 Mammal and Bird Count, Sarychat-Ertash Nature Reserve*

Common Name	Latin Name	Count
Mammals		
Argali (Adult Male)	Ovis ammon	390
Argali (Adult Female)		880
Argali (Juvenile)		180
Siberian ibex (Adult Male)	Capra sibirica	292
Siberian ibex (Adult Female)		466
Siberian ibex (Juvenile)		82
Snow leopard	Uncia uncia	13
Tien Shan brown bear	Ursus arctos isabellinus	10
Pallas's cat/Manul	Felis manul	12
Grey wolf	Canis lupus	53
Red fox	Vulpes vulpes	42
Rabbits/Hares	Leporidae	194
Grey marmot	Marmota baibacina	2699
Stone marten	Martes foina	12
Birds		
Eagles	Various species	24
Lammergeyer	Gypaetus barbatus	32
Pigeons	Columba spp.	153
Chukar partridge	Alectoris chukar	202
Himalayan snowcock	Tetraogallus himalayensis	99
Eurasian griffon	Gyps fulvus	36
Saker falcon	Falco cherrug	6

Source: Sarychat-Ertash Nature Reserve Administration

*Note: Counts presented here are the composite counts of numerous observers and include both animals resident in Sarychat-Ertash Nature Reserve as well as animals transiting the reserve's territory. Therefore the actual population of any given species in the reserve may be significantly lower than the figure given.

Conservation Issues. Issues confronting the reserve are numerous, and include the usual lack of funding, with rangers receiving salaries of about \$18 per month, and also extensive, Soviet-era overgrazing damage that is visible throughout much of the reserve, particularly on arid, snow-free, south-facing slopes that were intensively grazed in winter.

Probably the biggest issue with respect to management of the reserve is simply access to and travel within the reserve. The road to the main ranger base in the Ak-Shirak Valley is closed by deep snows from January through April, and intermittently closed from May to September by avalanches, and floods resulting from snow melt, glacier melt, and heavy rains. Rangers are unable to leave the immediate environs of the reserve after December and must lay in at least a four month supply of food to get them through the winter and early spring until the road reopens in May. For two to three months of the year, from June

to August, the Ertash River is a swollen torrent which the rangers refuse to cross, leaving northern sections of the reserve unpatrolled for several months in summer, as there are no bridges across the Ertash. Further hampering the rangers ability to patrol the reserve is their lack of basic camping equipment, such as tents and portable stoves, which limits their patrols to within a half day's horse ride of the nearest herding collective cabin along the Ertash River. Thus the time rangers can spend in the higher and more remote areas of the reserve, where wildlife is most abundant, is limited to one or two hours at midday, severely hampering their ability to monitor wildlife and patrol for poachers.

In addition to these internal issues facing the reserve, there are several external issues which threaten the ecological integrity of the reserve. The first is mining. The enormous, open-pit Kumtor Gold Mine, one of the world's largest, lies on the western boundary of the reserve at an elevation of about 4000 m (13,100 ft). The mine, which by itself accounts for about 10 percent of Kyrgyzstan's GDP, effectively blocks all westward expansion of the reserve (TCA 2002). The development of the huge gold deposit at Kumtor has attracted other mining interests to the area, and in the summer of 2003 one firm, apparently with permission from the national and provincial governments, conducted mineral exploration within the core zone of the reserve, finding small amounts of gold in the process. With a gold mine recently opening just south of the reserve, near the settlement of Ak-Shirak, it is not difficult to imagine mining operations in the mineral-rich area proliferating within the next decade, especially if the much rumored "Chinese tourist road" connecting Lake Issyk-Kul with Xinjiang via Bedel Pass is built. If built, this road would open the region year round to large volumes of vehicular traffic, and greatly facilitate the expansion of mining operations in the remote region.

A second major external issue that affects the park is that of the five commercial big game hunting concessions that lie immediately outside the boundaries of the reserve. These hunting camps have designated territories licensed from the Issyk-Kul provincial government, and, like the claim area of the Kumtor Gold Mine, block all expansion of the reserve onto the territory of these concessions. The commercial hunting camps cater to affluent foreign hunters from America, Europe, and Asia, who are willing to pay anywhere from US \$15,000 to US \$30,000 for a one-week argali hunt, argali being prized as a trophy among hunters because of their enormous horns. In spite of the fact that the two largest subspecies of argali, *Ovis ammon polii* and *Ovis ammon karelini*, are both listed in the red book of endangered species, permits to hunt either species can be purchased for US \$5000 per hunter.

While in many nations it is common practice to use the proceeds from the sale of hunting licenses to implement conservation measures to protect the species being hunted, this is not yet the case in Kyrgyzstan, where hunting license fees enter the general budget of government and are disbursed to unrelated agencies such as the highway patrol. Thus, while the Sarychat-Ertash reserve protects the large argali populations these hunting camps need to operate, the reserve reaps no financial benefit from these hunting operations. Equally problematic is the fact that the hunting concession of one operator includes nearly the entire designated southern buffer zone of the Sarychat-Ertash reserve, thus the operator's clients are actually allowed to hunt within the nature reserve.

In general, the reserve is far too small to achieve its stated goal of protecting threatened species such as the snow leopard, Tien Shan brown bear, and argali, which all require large home ranges in the low productivity tundra grassland ecosystem that the reserve is located in. Unfortunately, at the present time it appears that all future expansion of the reserve is blocked indefinitely by commercial hunting and mining interests.

Finally, the reserve staff are in general agreement that poaching at Sarychat-Ertash has declined tremendously over the course of the past 10 years, both because the Ertash Valley has been de-populated and because there are few remaining high value species, such as the snow leopard, to attract organized poaching rings to the remote area.

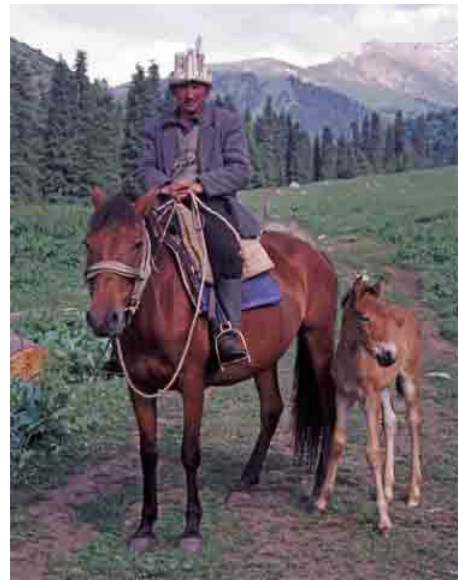
Chong-Jargalchak Wildlife Sanctuary (*Zakaznik*)

Location and Size. The Chong-Jargalchak Wildlife Sanctuary was established in 1990, and is located on the north slope of the Terskey Range about 70 km (45 mi.) southwest of Karakol, just south of the lakeshore village of Chong-Jargalchak. The sanctuary has an area of 231 sq. km (89 sq. mi.), which includes most of the Chong-Jargalchak River watershed.

Terrain. The terrain at the reserve resembles that of the Jeti-Oguz, Karakol, and Arashan River valleys further to the east (described above), although the Chong-Jargalchak Valley is somewhat shorter, being only about 22 km (14 mi.) in length. The valley rises steeply from an elevation of about 1900 m (6200 ft) at its mouth, to a maximum elevation of 4672 m (15,320 ft) in minor ice fields at the crest of the Terskey range, just beyond the sanctuary's southern boundary. Like much of the Terskey Range, the Chong-Jargalchak valley has a very Tyrolia-like aspect of mixed meadows, evergreen forests, ice fields, and towering snowy peaks.

Land-Use History and Management

Like the Jeti-Oguz Wildlife Sanctuary, Chong-Jargalchak is part of the large Jeti-Oguz Forestry Collective, and there are two active forestry camps in the sanctuary. The valley's meadows were formerly the summer pastures of a local herding collective, and continue to be grazed in summer by vastly reduced numbers of livestock that are managed by seven individual herders.



Sheep herder, Chong-Jargalchak Wildlife Sanctuary, Issyk-Kul Province.

At present, there is one ranger responsible for patrolling the sanctuary who lives in the village of Chong-Jargalchak and receives his small monthly salary from the state forest

service in Bishkek. There is a sign and gate at the entrance to the forestry collective, which doubles as the sanctuary entrance, but no sign indicating that the area is also a wildlife sanctuary.

Flora. The plant cover on the alluvial benches above the narrow mouth of the valley is dominated by arid grasses and various species of *Artemisia* and *Caragana* that grade into juniper shrublands just below the sanctuary's forest belt, which occupies a typical elevation range for forest in the Lake Issyk-Kul basin of about 2100 to 3000 m (6900 to 9800 ft). The forestry collective's tree nurseries are located in the lower valley as are large tracts of introduced species of pine, spruce, larch and birch identical to those on afforested areas throughout the eastern Terskey Range. Above the actively afforested slopes, stands of native Schrenk's spruce appear which have a much heavier mix of Tian Shan mountain ash than found further east in the Terskey range. Wet meadows are found throughout the valley, in and above the forest belt.

Fauna. In spite of easy access to the valley, wildlife is apparently still fairly abundant with wolves, roe deer, brown bear, Eurasian lynx, Pallas's cat, and Siberian ibex all still present, while three different sets of snow leopard tracks were observed in the upper valley in 2003.

Sacred Sites. The main sacred site in the reserve is a grove of poplars on the narrow river flood plain near the entrance of the sanctuary, which has not been cut since the 1960's when one morning a Russian geologist felled a poplar from the grove for firewood and died suddenly later that same day.

Recreational Features. The unmarked sanctuary has few visitors, which in 2003 totaled three French citizens, and at present no one in the village caters to tourists. Although day hikes, horseback riding, trekking, and birding in the reserve would all be possible, the area faces stiff competition for both local and foreign tourists from the adjacent Barskoon Valley to the east, which has a spectacular waterfall as its primary draw, and also from the more established trekking routes in the eastern Terskey range described above.

Conservation Issues. Conservation issues at the sanctuary include the lack of signs indicating the boundaries of the protected area, the lack of a general management plan for the sanctuary, and the inability of one ranger to adequately patrol the entire reserve.

3. International Protected Area Designations of Issyk-Kul Province

Lake Issyk-Kul Ramsar Site

As discussed above, Lake Issyk-Kul in its entirety has been designated a Ramsar Wetland of International Importance. However the lake receives no direct conservation or financial benefit from this designation, beyond raising the international profile of the lake among conservationists who are aware of the Ramsar program. Nevertheless, Ramsar designation may someday give conservation interests leverage concerning development and management of the lake basin (WI 2005).

Issyk-Kul Biosphere Reserve

With the assistance of the German Society for Technical Cooperation (GTZ), the entire province of Issyk-Kul was designated a biosphere reserve under the UNESCO-MAB program in 2001. The most visible manifestation of this designation is a large toll plaza located on the Bishkek highway, just outside of the town of Balykchy at the eastern end of Lake Issyk-Kul, that charges all private vehicles entering Issyk-Kul Province a US \$2.50 “ecological tax”, which nominally at least is used for funding the biosphere reserve. To date the biosphere reserve program has largely been limited to setting up of the biosphere administration, educating the public about the significance of biosphere reserve designation, especially with respect to the natural and cultural features of the reserve, and promoting tourism and improved agricultural practices in the reserve (GTZ 2002).

Thus far none of the seven protected areas the author visited in Issyk-Kul Province has received any direct material or financial benefit from UNESCO biosphere reserve designation beyond occasional staff trainings and participation in biosphere sponsored seminars. The staff of Karakol National Park said that in 2003 the biosphere administration proposed a project to catalog rare plants in the park, however, as yet no funding for the project has been provided. In October of 2004 a two-day symposium on the topic “Problems of the Sarychat-Ertash Nature Reserve” was held at the biosphere reserve’s administrative offices in Balykchy.

4. Protected Areas of Naryn Province

Karatal-Japyryk Nature Reserve (*Zapovednik*)

The Karatal-Japyryk Nature Reserve was established in 1994 and has a total area of 190.3 sq. km (73 sq. mi.). The reserve is somewhat unusual among protected areas in Kyrgyzstan in that it consists of three non-contiguous sections which are geographically very isolated from each other, while the reserve's administrative headquarters is located some distance from all three sections in the town of Naryn. Each of the three sections is discussed individually below.

Karatal-Japyryk Nature Reserve – Section 1: Lake Song-Kul

Location and Size. Lake Song-Kul is located in northern Naryn Province, about 120 km (75 mi.) south of Bishkek across the Kyrgyz Range. With an area of 273 sq. km (105 sq. mi.), Song-Kul is Kyrgyzstan's second largest lake (Table 1). The lake has a maximum length of about 30 km (19 mi.), a maximum width of about 18 km (11 mi.), and a maximum depth of 15 m (49 ft) (Konurbaev 2003). The easiest access to the lake is via the turnoff just south of the settlement of Sary-Bulak, located midway between Naryn and Balykchy on the Bishkek-Naryn highway, where a poorly maintained, 55 km (34 mi.) long, improved dirt road leads to the lake. Lake Song-Kul received highest level protection when designated a state nature reserve in 1998, however only 59 sq. km (23 sq. mi.) of the lake and a narrow adjoining belt of shoreline are actually protected, about 20 percent of the lake's total surface area (Tabysheva 2001).

Terrain. Lake Song-Kul sits at an elevation of 3028 m (9934 ft) atop a spectacular high grassy plateau of the Inner Tian Shan, and is entirely ringed by mountains that rise 600 to 900 m (2000 to 3000 ft) above the lakeshore and drop off precipitously to plunging river gorges on all sides. The lake is frozen much of the year, from October to June, and drains to the Naryn River, located 40 km to the south - the larger of two rivers that join to form the Syr Darya.



Stream delta marsh, Lake Song-Kul, Karatal-Japyryk Nature Reserve, Naryn Province.

Land-Use History. Throughout the Soviet era, the lake basin's primary use was as summer pasture for the local herding collectives. Winters in the remote lake basin are prohibitively cold for year-round use by herders, and only a few permanent structures were built around the lake. This continues to be the case today, with herders from the villages in the valleys below only occupying

the lake plateau for three or four months each year (see Appendix A, section on Song-Kul).

In about 1965, all of Lake Song-Kul and a narrow belt of its immediate shoreline were declared a wildlife sanctuary (*zakaznik*), presumably for the protection of the thousands of waterfowl which summer in the lake basin. However in 1998, the wildlife sanctuary status of the lake was dropped, and the lake was upgraded to a nature reserve (*zapovednik*), however, again, only 20 percent of the narrow eastern tip of the lake was protected under this new designation, while the remaining 80 percent of the lake no longer has any protected status.

Zoning and Management. Supposedly there are six rangers who reside year-round at Lake Song-Kul reserve, occupying two separate camps on the north and south shores of the lake. Although there are no signs indicating the ranger posts, a few signs have been posted near the lake shore indicating the boundary of the nature reserve.

Flora. The lake basin itself is treeless bowl with wet meadows along the lake shore and well-watered upland meadows on the surrounding mountains slopes. Wildflowers are abundant and include a species of wild poppy (*Papaver croceum*). Where large streams enter the lake, there are a number of marshy areas dominated by tall emergent grasses.

Fauna. Prior to 1975, the primary fauna in the fishless lake was a species of freshwater shrimp, *Gammarus krevetki*, which was completely eliminated by the numerous fish introductions of the late 1970s. Today, four species of introduced fish are known to inhabit the lake, of which peled (*Coregonus peled*), introduced from Lake Baikal, is the only remaining species of commercial importance. The other three species are common whitefish (*Coregonus lavaretus*) introduced from Lake Sevan in Armenia, naked osman (*Diptychus dybowskii*), and grey loach (*Noemacheilus dorsalis*), both having been introduced from Lake Issyk-Kul (Konurbaev 2003, Savvaitova 1999).

Lake Song-Kul is an important summer nesting ground for many species of waterfowl, at which time “rafts” of hundreds of ducks and other birds are visible from the lake shore. Waterfowl at the lake include significant populations of grey heron (*Ardea cinerea*), whooper swan (*Cygnus cygnus*), ruddy shelduck (*Tadorna ferruginea*), northern pintail (*Anas acuta*), common pochard (*Aythya ferina*), gadwall (*Anas strepera*), red-necked grebe (*Podiceps grisegena*), and black tailed godwit (*Limosa limosa*). Song-Kul is also one of two places in Kyrgyzstan where the bar-headed goose (*Anser indicus*) is known to nest in small numbers, the other known nesting site being Lake Chatyr-Kul (van der Ven 2002).

Sacred Sites. The primary sacred site at the lake is a rock outcrop on the southern shore called “Tulga-Tash”, which is a monument of the Manas epic, the oral legend of the Kyrgyz people which is believed by many Kyrgyz to be an accurate historical record of their origins.

Recreational Features Because of its dramatic mountain setting, the lake is becoming an increasingly popular stop for foreign tourist during the short two month summer tourist season. Many herding camps around the lakeshore now cater to tourists, providing accommodation in yurts, meals, horse rentals, guide services, and transportation to and from towns along the highway. Recreational possibilities include birding and trekking through any of the spectacular canyons leading off the lake basin plateau. Furthermore, foreign mountain bikers are increasingly discovering the three main Soviet-era gravel roads that lead into and out of the lake basin. Estimates of the number of foreign visitors at Lake Song-Kul each year vary widely among the Karatal-Japyryk administrative staff, ranging from 400 to 3,000, however, the lower half of that range is probably more accurate.

Conservation Issues. Probably the largest conservation issue at Lake Song-Kul is the question of how effective the reserve is when only a fraction of the lake and its wetlands are protected. Overfishing is apparently a significant problem for the lake's introduced fish populations, and there appears to be no effective monitoring of the catch from the lake. However, it does not appear that the Kyrgyz have taken up the Russian pastime of duck hunting, although this may change if a market for Kyrgyz wild waterfowl ever develops in the Chinese city of Kashgar, which is only a day's drive away. During the author's two-day visit to the lake, no boats were seen. From all accounts, little wildlife remains in the mountains surrounding the lake due to overhunting by the local population.

Karatal-Japyryk Nature Reserve – Section 2: Karatal River Canyon

Location and Size. The Karatal River Canyon section of the tri-part Karatal-Japyryk Nature Reserve lies about 15 km (9 mi.) south of the eastern end of Lake Song-Kul. This section of the reserve was established in 1994, and has a total area of 60 sq. km (23 sq. mi.). Access to the Karatal Canyon is via the southeast Lake Song-Kul road, which begins about 15 km (9mi.) south of Dolon Pass on the Bishkek-Naryn Highway.



Tributary canyon of the Karatal River, Karatal-Japyryk Nature Reserve, Naryn Province.

Terrain. Elevation in the Karatal Canyon section of the reserve ranges from roughly 2500 m (8200 ft) at the reserve's eastern entrance near the junction of the Karatal and Song-Kul Rivers, to about 3700 m (12,100 ft) atop a ridge of the Moldo-Too Range, which forms the southern boundary of

the reserve. The northern boundary of the reserve partially coincides with a second ridgeline that forms the divide between the Lake Song-Kul basin and the Karatal River watershed. Terrain in the reserve is dominated by the plunging canyon of the Karatal River, which flows, for the most part, in an easterly direction. Two other important tributary canyons within the reserve are those of the Diaman-Suu and Terme Rivers.

Land-Use History, Zoning, and Management. The objective of this section of the nature reserve is to protect the flora, fauna, and ecosystems of the dramatic Karatal Canyon, which was left relatively undisturbed throughout the Soviet period, presumably because of the difficulty of logging the rugged terrain in the upper canyon. However, most of the lower territory of the reserve was formerly a forestry collective, and a rough logging road does exist in the lower canyon. Unlike the forestry collectives of the Terskey Range, no afforestation projects appear to have been conducted in the canyon.

The Karatal Canyon section of the reserve is divided into two zones, a core zone in the remote upper area of the reserve and a multi-use buffer zone in the lower reserve, near the reserve's main access road. There are currently 12 rangers and one forester who work in Karatal Canyon. Several family-run herding camps are located inside the buffer zone, and in addition to grazing livestock in the reserve, rangers also conduct a limited amount of fairly discreet, sanctioned, selective logging of native Schrenk's spruce in the lower reserve, which is then sold to contribute to the general funding of the reserve's operations.

Flora. The shady south side of the canyon has a fairly extensive forest cover of Schrenk's spruce, which grades into alpine meadows topped by small snowfields and tall craggy cliffs and outcrops. The sunny, northern side of the canyon is covered in shrubs and arid upland grass species.

Fauna. The Karatal River canyon is said to be home to snow leopard, Eurasian lynx, and Pallas's cat, although, if still extant, these populations are probably extremely isolated at this point in time. Presumably the reserve also provides habitat for Siberian ibex, roe deer, and the ubiquitous grey wolf.

Sacred Sites. The primary sacred site in this section of the reserve is the Khansalyk waterfall.

Recreational Features. Recreation opportunities include horse treks, and in one government protected area brochure the reserve actually advertises two-day horse treks through the reserve at a price of US \$200 per person (SFSKR 2003). Thus far, though, the reserve has had few takers and faces stiff competition with the tourist industry at Song-Kul, which will provide the same services to visit neighboring canyons for the price of about US \$25 per day per person. Two hand painted signs indicating the reserve's existence are posted on the road to the reserve, but in general this section of the reserve is poorly marked and little known.

Conservation Issues. Conservation issues at the Karatal Canyon section of Karatal-Japyryk are primarily those of funding, which at the present time is so limited as to necessitate logging in the reserve by the reserve staff. Poaching of wildlife at the reserve is said to have declined since peaking in the mid to late 1990's, but this may be due to the fact that few wild animals remain in the reserve and the surrounding area. This section of the reserve is also too small to meet its stated goal of protecting threatened animal species with large home ranges, such as the snow leopard.

Karatal-Japyryk Nature Reserve – Section 3: Lake Chatyr-Kul

Location and Size. Lake Chatyr-Kul, Kyrgyzstan's third largest lake, is located 10 km (6 mi.) north of the Chinese border near Torugart Pass in southern Naryn Province. The lake has an area of 150 sq. km (58 sq. mi.) and maximum dimensions of 20 km (12 mi.) in length and 10 km (6 mi.) in width. The maximum depth of the lake is about 20 m (66 ft), although most of the lake is only a few meters deep (Konurbaev 2003). Lake Chatyr-Kul has no outlet and is slightly saline.



Lake Chatyr-Kul, emergent grasses in foreground, Karatal-Japyryk Nature Reserve, Naryn Province.

Terrain. Lake Chatyr-Kul sits at an elevation of 3560 m (11,680 ft) in a broad treeless basin between the snowy peaks of the 4800 m (15,750 ft) high At-Bashy Range to the north and the 5100 m (16,730 ft) high Torugart Range along the Chinese border to the south. The lake is fed in large part by snow and glacier melt from these two ranges, and the glacier fields of the Torugart Range provide a scenic backdrop to the lake. Lake Chatyr-Kul begins to freeze over in September and remains frozen until June.

Land-Use History. In the late Soviet period, the grasslands of the lake basin were used as summer pasture for up to 150,000 sheep by herding collectives based near the district center of At-Bashy, located about 70 km (43 mi.) to the northeast. However today, fewer than 12,000 sheep are pastured around the lake in summer (see Appendix A, Chatyr-Kul section).

In 1971, Lake Chatyr-Kul was designated a wildlife sanctuary (*zakaznik*), for the protection of the abundant waterfowl that nest at the lake in summer. However, in the late 1990s, the protected status of the lake was upgraded to a fully-protected nature reserve (*zapovednik*), which included the entire surface of the lake and a narrow belt of shoreline. Regrettably in 2004, the lake's protected status was terminated so that a fishery could be started in the fishless lake.

Management. The lake is patrolled by three rangers who maintain summer camps on the north, east, and west sides of the lake. In winter, all three rangers reside at the Torugart Pass border post just south of the lake.

Flora. Flora in the lake basin is dominated by arid grass species, while coarse emergent grasses grow in the shallows of the lake.

Fauna. The lake is fishless, but home to freshwater shrimp (*Gammarus Krevetki*) which formerly existed in Lake Issyk-Kul and Lake Song-Kul prior to Soviet-era fish introductions (Konurbaev 2003). Bird life at Lake Chatyr-Kul resembles that of Lake Song-Kul, with the most notable species summering at the lake being the bar-headed goose (*Anser indicus*), which in the Kyrgyz Republic is only known to nest at Lakes Chatyr-Kul and Song-Kul (van der Ven 2002).

Sacred Sites. Sacred sights at the lake include a mineral spring located on the south side of the lake, just before the Torugart border post, that is said to have excellent curative powers.

Recreational Features. Recreation possibilities at the lake include excellent opportunities to observe large numbers of waterfowl, horseback riding, and trekking over the At-Bashy Range, to and from the heavily-touristed Tash-Rabat Valley, the site of a 15th century stone caravansera.

Conservation Issues. Lake Chatyr-Kul is the last large, relatively pristine, high mountain aquatic ecosystem in the Kyrgyzstan Tian Shan, and the lake is now under threat of fish introductions. The Times of Central Asia reported on September 9, 2004, that the Kyrgyz Prime Minister had decided to terminate the fully-protected nature reserve status of the lake (TCA 2004c). When asked about this situation three weeks later, the director of the Karatal-Japyryk Nature Reserve replied that the matter was “secret”, and he couldn’t discuss it. However, numerous other civil servants from the Naryn provincial government freely stated that the protected status of Lake Chatyr-Kul was rescinded because high ranking officials in the provincial government wished to start up a fishery at the lake, an activity which is prohibited in designated nature reserves. As of October 2004, the fishery project was still in the planning stages and fish had not yet been introduced into the lake.

At the present time, there does not appear to be a significant problem of hunting of waterfowl at the lake, and during the author’s two day visit to Lake Chatyr-Kul no boats or rafts were observed. However, given the proximity of the Chinese city of Kashgar, about a half-day’s drive to the south, it is conceivable that hunting of wild waterfowl at the lake for the restaurants of Kashgar may one day be a problem.

Salkyn-Tor National Park

Location and Size. Salkyn-Tor National Park is located on the forested north slope of the Naryn Range, about 18 km (11 mi.) east of the town of Naryn. The park was established in 2001, and has an area of 104 sq. km (40 sq. mi.) centered around the beautiful Salkyn-Tor River gorge. Access to the park is via a fairly well maintained highway that runs along the southern bank of the Naryn River. An entrance fee of US \$1.00 per foreign visitor is charged at the main entrance to the park.

Terrain. The elevation range in the park varies from about 2200 m (7200 ft) at the park entrance gate to roughly 4000 m (13,100 ft) on the crest of the Naryn Range. Terrain in the reserve is steep, with the Salkyn-Tor River descending a narrow, forested gorge with imposing cliffs faces. The gorge opens up above tree line at 3000 m (9800 ft), to alpine grasslands set in a broad bowl below a ridgeline topped by a series of towering rocky peaks and small snow fields.



River gorge, Salkyn-Tor National Park, Naryn Province.

Land-Use and Management. A Soviet-era tourist camp has long occupied the bottom of the gorge, consisting of tiny cabins and picnic gazebos that were typical of the era. In summer a limited number of animals are grazed on meadows higher in the gorge. At the time of the author's visit a small logging operation appeared to be under way to salvage large spruce trees felled by an avalanche the previous winter. Prior to being declared a National Park, Salkyn-Tor had been the western half of a wildlife sanctuary (*zakaznik*). The administrative offices of the park are located in the town of Naryn.

Flora. The park's lower gorge is dominated by dense stands of Schrenk's spruce mixed with Tian Shan mountain ash. Birches occur along the banks of the river, while a thick growth of deciduous shrubs occupies river bottom areas and sunnier south-facing slopes, including species of wild rose, willow, and barberry.

Fauna. One objective of the park is to increase the local elk population, which has declined sharply since independence due to overhunting for meat. Other fauna known to inhabit the forests of the Naryn Range include roe deer, Eurasian lynx, and brown bear.

Recreational Features. The primary recreational function of the park is as a popular summer picnic spot for families from Naryn. While there are some excellent hiking possibilities at Salkyn-Tor, the overgrown state of the main trail up the gorge suggests that few visitors avail themselves of these opportunities. However, a short one hour hike along the unmaintained trail rewards one with scenic vistas of the lower gorge. About

halfway up the main valley, the unsigned trail deteriorates into several livestock tracks that lead up side valleys.

Conservation Issues. Although a primary goal of the national park is to protect game species in the area, wildlife numbers in the park are probably limited due to the close proximity of numerous villages in the well-populated Naryn River valley. Another issue is the fact that the park is rather small and only protects a 15 km (9 mi.) long stretch of just the north slope of the Naryn Range, while the south slope is entirely unprotected.

Naryn Nature Reserve (*Zapovednik*)

Location and Size. The Naryn Nature Reserve is located about 40 km (25 mi.) east of the town of Naryn. The reserve was established in 1983, and with a total area of 1080 sq. km (417 sq. mi.), it is Kyrgyzstan's third largest protected area after Sarychat-Ertash and Chong-Kemin. The reserve is about 70 km (43 mi.) long, 15 km (9 mi.) wide, and centered around a largely inaccessible stretch of the upper Naryn River canyon. The Naryn reserve is bounded by the crest of the Jetim-Bel Range to the north, and by the crest of the Naryn Range to the south. Access to the reserve is generally from the west via the village of Tash-Bashat, which is located on the paved highway from the town of Naryn. Alternatively the reserve can be accessed by jeep from the east via the Barskoon/Kara-Sai road and an isolated mountain village, which, like the Issyk-Kul provincial capital, is named Karakol.



Naryn River canyon with forest cover of Schrenk's spruce, Naryn Nature Reserve, Naryn Province.

Terrain. Elevation in the Naryn Nature Reserve ranges from about 2200 m (7200 ft) on the Naryn River at the west end of the reserve to a high point of about 4500 m (14,760 ft) in the Jetim-Bel Range on the reserve's northern boundary. Terrain in the nature reserve is dominated by the deep, winding canyon of the Naryn River, which is lined with steep mountain slopes, and in places sheer walls, that rise immediately out of the river, there being very little floodplain to speak of within the reserve. All along the river, high mountain peaks with permanent snow and ice fields are visible. The tortuous main trail through the reserve climbs repeatedly in and out of the steep sided river canyon.

Land-Use History. As for the land use history of the reserve, in 1908 the independent Naryn Forest District was established from the administrative holdings of the tsarist-era Pishkek (now Bishkek) and Przhevalski (now Karakol) Forest Districts. In 1922 the

forest was reorganized as the Naryn Instructional Production Forest (ru: *Uchlesprom-khoz*), with a focus on harvesting of timber, which in turn was reorganized in 1945 as the Naryn Forestry Collective (*leskhoz*). At this time the afforestation efforts began, which included the introduction of non-native species of trees. In 1972 a multi-use wildlife sanctuary (*zakaznik*) was established on forest collective territory, the primary purpose of which was to protect elk populations so that they could be hunted sustainably outside the sanctuary. In 1983, the status of the sanctuary was upgraded from a wildlife sanctuary (*zakaznik*), essentially a multi-use no-hunting zone, to a fully protected nature reserve (*zapovednik*).

In addition to forestry activities, throughout the Soviet period sheep and other livestock were grazed on the territory of the forestry collective, and later in the buffer zones of the nature reserve. At the height of the collective period in late 1980's, these flocks numbered somewhere between 200,000 and 300,000 sheep, which were managed by several herding collectives from the villages of the Naryn River valley located to the west of the nature reserve. Today, grazing damage from this period in the form of grazing tracks, chronic erosion, and proliferation of invasive woody species is still readily visible in the reserve's western buffer zone.

Zoning and Management. The Naryn Nature Reserve is divided into two zones, a core zone with an area of 370 sq. km (143 sq. mi.), and a much larger multi-use buffer zone with an area of 710 sq. km (274 sq. mi.). The reserve's core zone lies primarily on the forested north-facing slope of the Naryn Range, located above the south bank of the Naryn River. Again, all human visitation and activities are prohibited in the core zone, with the exception of ranger patrols and scientific research relevant to the reserve's operational objectives.

The much larger buffer zone covers the eastern and western ends of the reserve, as well as a large swath of territory on the south-facing slope of the Jetim-Bel Range located north of the Naryn River. Occasional afforestation efforts using introduced species of spruce and pine are still ongoing in the western buffer zone, although much larger plantings can be found just outside the reserve on the slopes above the reserve's main ranger base. Meadows in the reserve's buffer zones continue to be used for subsistence herding by reserve rangers, although there are at least two herding camps in the western buffer zone owned by families not employed by the reserve whose land tenure apparently predates creation of the nature reserve.

The reserve employs 15 rangers and two foresters. There are two permanent ranger camps within the reserve that are occupied year round, located on the eastern and western fringes of the core zone. There are also two ranger camps in the center of the reserve on its remote northern and southern boundaries that are occupied seasonally for about half the year, from April to October. In addition to these four camps, there is a fifth ranger camp near the western entrance to the reserve which has a small deer nursery with a few elk and roe deer for visitors to see. The reserve's main ranger base is in the village of Tash-Bashat, while the reserve's administrative headquarters are located in the town of Naryn.

The reserve administration owns 28 horses with which to patrol the park, however this is considered to be far too few for the large ranger staff given the long distances that must be covered on horseback within the reserve.

Flora. Hundreds of species of plants have been identified within the Naryn Nature Reserve (T. Akimaliev, personal communication 2004). Apart from introduced tree species in the western buffer zone and native birch and willow immediately along the banks of the Naryn River, the extensive forest cover in the reserve consists almost exclusively of native Schrenk's spruce interspersed with Tian Shan mountain ash. Important shrub species include wild rose, barberry, junipers, and buckthorn. Other plant life among the diverse flora of the reserve includes 20 species of grass, dozens of species of wildflowers, and 33 species of plants with medicinal uses (Akimaliev 2004).

Fauna. Animal life at the Naryn Nature Reserve is diverse due the presence of extensive tracts of spruce forest, montane meadows, and a large alpine zone. The reserve contains not only large populations of woodland species, such as elk and roe deer, but also such alpine dwelling species as snow leopard, Siberian ibex, and argali, as well as the ubiquitous wolf, fox, and brown bear. Counts of selected mammal species from the summer 2004 biological survey of the reserve are given in the Table 15, below. The remote southeast quadrant of the reserve is said to be particularly rich with large mammalian fauna.



Elk (*Cervus elaphus*), Naryn Province.

The 2004 wildlife survey of the reserve lists 48 species of birds, including Himalayan snowcock, chukar, Daurian partridge, several falcon species, golden eagle, lammergeyer, Himalayan griffon, and the black-eared kite (Akimaliev 2004).

Sacred Sites. One sacred site in the reserve is a large rock outcrop in the western buffer zone known as “Kara-Tash”, which is believed to have the power to cure fertility problems if a childless couple sacrifices a ram at the rock. Other sacred sites within the reserve include a number of springs, as well as an important site associated with the Er Tabyldy, a legendary Kyrgyz warrior of the 16th century resistance against the Oirat Mongols, who, like Manas, is the hero of a Kyrgyz epic poem.

Table 15. 2004 Large Mammal Count, Naryn Nature Reserve*

Common Name	Latin Name	Count
Argali	<i>Ovis ammon</i>	600
Eastern roe deer	<i>Capreolus pygargus</i>	300
Elk	<i>Cervus elaphus</i>	285
Eurasian badger	<i>Meles meles</i>	50
Eurasian lynx	<i>Lynx lynx</i>	8
Grey wolf	<i>Canis lupus</i>	50
Pallas's cat/Manul	<i>Felis manul</i>	3
Red fox	<i>Vulpes vulpes</i>	100
Siberian ibex	<i>Capra sibirica</i>	700
Snow leopard	<i>Uncia uncia</i>	6
Stoat	<i>Mustela erminea</i>	200
Stone marten	<i>Martes foina</i>	100
Tien Shan brown bear	<i>Ursus arctos isabellinus</i>	20
Weasel	<i>Mustela nivalis</i>	500

Source: Akimaliev 2004.

*Note: Counts presented here are the composite counts of numerous observers and include both animals resident in Naryn Nature Reserve as well as animals transiting the reserve's territory. Therefore the actual population of any given species in the reserve may be significantly lower than the figure given.

Recreational Features. Like the Karatal-Japyryk Nature Reserve, the administration of the Naryn Nature Reserve has decided to open their reserve to a limited number of visitors in hopes of generating extra income to improve management of the severely underfunded reserve. Recreational possibilities include visits to the reserve's deer nursery to see elk and roe deer, horseback riding, ranger-led treks, and possibly even rafting. In the state forest service protected areas brochure, the reserve is promoting daytrips from Naryn to the reserve's deer nursery for a fee of US \$50 (SFSKR 2003). Longer tours of the reserve are also possible, and the reserve administration has set the following price schedule:

US \$12.50 per day per person entry fee (mandatory)
 US \$15.00 per day per party guide fee (mandatory)
 US \$25.00 per day per horse rental fee (optional)

For a party of two on horseback, this works out to US \$90 per day, which does not include food, accommodation, or transportation to the reserve. Given the much cheaper rates available to trek in equally if not more spectacular landscapes at Lake Song-Kul, Lake Chatyr-Kul, and the Terskey Range, it is not too surprising that the reserve has only had six foreign visitors over the two-year period from 2003 to 2004.

Conservation Issues. As at all protected areas in Kyrgyzstan, the lack of funds for operating the reserve is an enormous problem, and rangers make a base salary of less than

US \$20 per month. Although there are a few signs posted along the western trail into the reserve, in general the reserve's boundaries are not adequately marked, while the core zone boundaries are not marked at all. What few signs do exist are only in Kyrgyz, and should probably also be translated into Russian and possibly English. As at all areas with significant populations of large mammalian species, poaching is an ongoing threat that must be guarded against. Naryn Province itself is home to about 40 commercial hunting concessions catering to foreign big game hunters willing to pay US \$15,000 to US \$30,000 fee one-week argali and ibex hunts. Five of these hunting concessions lie just outside the boundaries of the Naryn reserve. However, as at the Sarychat-Ertash Nature Reserve, the US \$5000 per hunter license fee for argali hunts is disbursed directly to the national and provincial governments, and the reserve receives no direct benefit from commercial hunting tours taking place on its boundaries.

Finally, as with all existing protected areas in the Kyrgyz Republic, the Naryn Nature Reserve is far too small to effectively sustain viable populations of large mammalian species such as elk, brown bear, and snow leopard. Like the neighboring Salkyn-Tor National Park, the reserve only protects an isolated stretch of the north slope of the Naryn Range, while the south slope is entirely unprotected

Wildlife Sanctuaries (*Zakazniky*) in Naryn Province

One small, national level wildlife sanctuary (*zakaznik*) established for the protection of forest ecosystems is the Kaiyndy sanctuary, located on the north slope of the Naryn Range between Salkyn-Tor National Park and the Naryn Nature Reserve. The sanctuary is unsigned, and appears to exist in name only.

A second small sanctuary in Naryn is the Kochkor Wildlife Sanctuary (*zakaznik*) located near the town of Kochkor. The sanctuary protects about 20 sq. km (8 sq. mi.) of grasslands that serves as favored nesting grounds for game bird species, such as the Daurian partridge and Chukar.

The At-Jailoo "sanctuary" is said to cover about 300 sq. km (115 sq. mi.) in the Jangy-Jer Range, just south of the eastern end of the Naryn Nature Reserve. By all accounts, the sanctuary was apparently established by a decree issued by the Issyk-Kul provincial government that essentially forbade hunting of argali at At-Jailoo for a 5-year period from 2003-2008.

B. The Protected Areas of Western and Southern Kyrgyzstan

1. Tian Shan Range

i) *Talas Province*

Besh-Tash National Park

Besh-Tash National Park is located on the north slope of the Talas Range in the Western Tian Shan, about 13 km (8 mi.) south of Talas, the capital of Talas Province. The park was established in 1996 with an area of 324 sq. km (125 sq. mi.) that is accessed by a 30 km (19 mi.) long jeep track through the park. The park's most prominent geographical feature is the Besh-Tash River, which flows the length of the park. Habitat in the park includes forest and alpine meadows. Probably the single most significant species of plant in the park is Semenov's Fir (*Abies semenovii*), which is endemic to the western Tian Shan. Notable animal species found in the park include snow leopard, Eurasian lynx, golden eagle, Himalayan griffon, saker falcon, and lammergeyer. The administrative headquarters of Besh-Tash National Park are located in the town of Talas. (Summarized from SFSKR 2003).

Talas Wildlife Sanctuary (*Zakaznik*)

The Talas Wildlife Sanctuary was established in 1986 with an area of 25 sq. km (10 sq. mi.). The sanctuary protects riparian habitat including tugai forests with thickets of sea-buckthorn and reeds. The main objective of the reserve is to increase pheasant populations (Vorobeev 2003).

ii. *Jalalabad Province*

Besh-Aral Nature Reserve (*Zapovednik*)

The Besh-Aral Nature Reserve is located in the westernmost corner of Jalalabad Province, on Kyrgyzstan's shared border with Uzbekistan. The reserve was established in 1979 and has an area of 632 sq. km (244 sq. mi.) centered around the lower Chatkal River, which flows from Kyrgyzstan into Uzbekistan. The reserve is bounded by the Pskem Range to the northeast while the Ters River forms the southeast boundary of the reserve. The administrative headquarters of the reserve is located in the village of Jangy-Bazar, about 15 km (9 mi.) east of the reserve on the south bank of the Chatkal River.

Terrain in the reserve is mountainous, with elevations ranging from about 1000 to 4000 m (3300 to 13,100 ft). Prior to being declared a nature reserve, the territory of the reserve was used heavily by herding collectives from both the Kyrgyz and Uzbek Soviet Socialist Republics. Livestock populations in the area at this time numbered in the hundreds of thousands, which led to extensive grazing damage to local ecosystems.

Grassland ecosystems are the predominant land cover in the reserve and include steppe, and sub-alpine and alpine meadow types. There is also some limited forest cover in the reserve, including small areas of juniper forests, deciduous forest, and riparian forest. Notable plant species at Besh-Aral include various rare species of wild fruit trees and wild tulips. Notable animal species in the reserve include the endemic Menzbier's marmot, which is presently threatened and believed to have a total population of less than 1000 individuals. Snow leopard, brown bear, Eurasian lynx, golden eagle, and griffon are also known to inhabit the reserve.

Prior to closing of the Uzbek border following independence, rafting on the Chatkal River through the reserve to the Charvak Reservoir in Uzbekistan was a popular activity for Soviet tourists to the region. At the present time both foot and horse treks are possible on designated routes within the reserve. (Summarized from Mambetaliev 2003a, SFSKR 2003).

Sary-Chelek Nature Reserve (*Zapovednik*)

The Sary-Chelek Nature Reserve is located on the south-east facing slope of the northern Chatkal Range in central Jalalabad Province. The reserve was established in 1959 with an area of 239 sq. km (92 sq. mi.) centered around the scenic Lake Sary-Chelek. Due to the exceptionally diverse flora and fauna found in the mountains immediately surrounding Lake Sary-Chelek, the entire nature reserve was declared a UNESCO-MAB biosphere reserve in 1978. Access to the reserve is via the town of Tash-Komur, located on the Bishkek-Jalalabad highway on the northern fringe of the Ferghana Valley. The reserve's administrative headquarters are in the town of Arkyt, located inside the reserve about eight kilometers (5 mi.) south of the Lake Sary-Chelek.

Elevation in the reserve ranges from about 1200 m (3900 ft) on the Khodja-Ata River at the reserve's southern boundary to 4247 m (13,930 ft) in the Chatkal Range on the northern boundary of the reserve. Lake Sary-Chelek has an area of about 13.9 sq. km (5.4 sq. mi.) and is located at an elevation of 1876 m (6153 ft) in the center of the reserve (Table 1). Cliffs and steep mountain slopes rise immediately out of the lake's waters.

Prior to creation of the reserve, the area was used intensively by the villagers of Arkyt for collecting walnuts, cutting of timber for fuel and lumber, as well for grazing livestock. Following establishment of the reserve, restrictions were placed on these subsistence activities, however Sary-Chelek became a popular destination for Soviet tourists. It is

hoped that the growing tourism industry will help support the 150 families, about 1050 persons in total, who reside in the village of Arkyt today (Mambetaliev 2003b).

The reserve is divided into two zones: 1) a core zone with an area of 215 sq. km (83 sq. mi.), or 90 percent of reserve territory, that is nominally closed to visitation, and 2) a multi-use zone with an area of 24 sq. km (9 sq. mi.), or 10 percent of reserve territory, where residents of the village of Arkyt are permitted to utilize natural resources at a subsistence level (Mambetaliev 2003b).

The Sary-Chelek reserve is endowed with what may be the widest variety of flora and fauna to be found in the Tian Shan, due to the wide variety of ecosystems and habitats that converge in the reserve. These ecosystems include spruce forests, juniper forests, wild fruit and nut forests, riparian forests, and a variety of steppe and meadow ecosystems. Flora in the reserve consists of 677 species of higher plants, including Schrenk's spruce and wild apple and walnut trees, as well as several types of wild geraniums (Mambetaliev 2003). Fauna in the reserve includes 35 species of mammals and 157 species of birds, notably snow leopard, brown bear, Eurasian lynx, badger, golden eagle, lammergeyer, saker falcon, and peregrine falcon (Mambetaliev 2003b).

Sacred sites in the reserve include the tomb of Toskol-Ata, a much revered local seer, which is located on the south shore of the lake. Recreational opportunities in the reserve include home-stays in the village of Arkyt and horse and foot treks through the park. One popular three to five day trek begins near the town of Kyzyl Oktyabr in the Talas River valley, crosses the crest of the Talas Range and then a spur of the Chatkal Range, before finally descending to Lake Sary-Chelek (HDGC 1990).

Primary conservation issues at the Sary-Chelek Nature Reserve resulting from the activities of the local residents of Arkyt include both excessive cutting of trees for firewood and overgrazing damage caused by livestock. Conservation issues resulting from excessive tourist pressure in the reserve, which totals about 1000 persons per year, includes trampling of lake shore vegetation, picking of endangered medicinal plants and wildflowers, and widespread littering. (Summarized from Mambetaliev 2003b, SFSKR 2003, UNESCO 2005b, HDGC 1990, Konurbaev 2003).

Padysha-Ata Nature Reserve (*Zapovednik*)

The Padysha-Ata Nature Reserve is located on the southeast slope of the Chatkal Range, about 30 km (19 mi.) southwest of the Sary-Chelek Nature Reserve. The reserve has an area of 306 sq. km (118 sq. mi.) along the Padysha-Ata River and was established in 2003. Access to the reserve is via the town of Kerben in Jalalabad Province's Aksy District. Terrain in the Padysha-Ata reserve is similar to that of the neighboring Sary-

Part IV - Protected Areas of the Kyrgyz, Kazakh, Uzbek, and Xinjiang Tian Shan

Chelek reserve, and the reserve's primary goal is the protection of the native West Tian Shan forest ecosystem. (Summarized from SFSKR 2003).

Saimaluu-Tash National Park

Saimaluu-Tash National Park is located on the northeast facing slope of the Ferghana Range in Jalalabad's Toguz-Toro District, near the triple junction of the Jalalabad, Osh, and Naryn provincial boundaries. The park was established in 2001, and has an area of 320 sq. km (124 sq. mi.) along the Kugart River. The administrative headquarters of the park are located in the district center, Kazarman, and access to the park is via a jeep track which begins in the village of Chet-Bulak, just south of Kazarman.

The most significant feature of the park is its numerous Bronze-Age petroglyph sites, which are considered of global importance. In addition, species diversity in the park is quite high, with 1500 plant species having been identified, and threatened animal species such as brown bear, Eurasian lynx, golden eagle and lammergeyer resident in the park. (Summarized from SFSKR 2003).

2. Pamir-Alai Range

i) Osh Province

Kyrgyz-Ata National Park

Kyrgyz-Ata National Park was established in 1993 with an area of 112 sq. km (43 sq. mi.) located on the northern slope of the Kichi-Alai Range, about 45 km (28 mi.) southwest of the town of Osh. Access to the park is via the town of Eski-Nookat, the administrative center of Osh Province's Nookat District. The primary objective of the park is to protect the unique southern juniper forests of Kyrgyzstan's Alai Mountains. Flora and fauna in the park include 700 species of plants, and the following threatened animal species: brown bear, Eurasian lynx, short-tailed snake eagle (*Circaetus gallicus*), golden eagle, Himalayan griffon, and saker falcon. (Summarized from SFSKR 2003, Vorobeev 2003).

Kara-Shoro National Park

Kara-Shoro National park is located near the town of Kara-Kulja, about 40 km (25 mi.) southeast of Ozgon in north-central Osh Province, at the point where the Alai and Ferghana Ranges converge. The park was established in 1996 with an area of 85 sq. km (33 sq. mi.), of which about 10 percent is forested, while the remaining area is comprised of grasslands suffering from varying degrees of Soviet-era grazing damage. Zones in the park include a designated recreation zone and a zone set aside specifically for the restoration of damaged grassland habitat. Flora and fauna in the park include over 700 species of plants and such notable animal species as the Eurasian lynx, golden eagle, and Himalayan griffon. The administrative headquarters of the park are located in the town of Myrza-Ake, about 15 km east of Ozgon. (Summarized from SFSKR 2003).

ii) Batken Province

At the time of this writing there were no protected areas in Batken Province. However, there are a number of areas in Batken's Alai and Turkestan Ranges that merit protection for their outstanding scenic and ecologic values, and three sites in the province are currently being proposed for protection.

C. Protected Areas of the Kazakhstan Tian Shan

Of the following three protected areas in the Kazakhstan Tian Shan, the author only visited the Almaty Nature Reserve on a two-day site visit, while the descriptions of the other two protected areas are summarized from internet sources. The protected areas of the Tian Shan discussed in Sections C, D, and E, which follow, are summarized in Table 16 on pg. 110, below.

1. Northern Tian Shan - Almaty Province

Almaty Nature Reserve (*Zapovednik*)

Location and Size. The Almaty Nature Reserve was first established in 1931 and has an area of 733 sq. km (283 sq. mi.) located about 30 km (19 mi.) by road east of Kazakhstan's largest city, Almaty. The reserve is situated just 10 km (6 mi.) north of the Kyrgyz border and only 35 km (22 mi.) from the north shore of Lake Issyk-Kul (Map 6, pg. 53, above).



Peak Talgar, elevation 4973 m (16,312 ft), Almaty Nature Reserve, Zailie Range, Northern Tian Shan, Kazakhstan.

Terrain. Elevation in the reserve ranges from about 1200 m (3900 ft) on the northern boundary of the reserve to 4973 m (16,312 ft) atop Peak Talgar, the highest peak in the Northern Tian Shan (UNEP 1991a). Terrain in the reserve is dominated by several north-south trending spurs of the Zailie Range which form an extensive network of deep valleys and ravines that are oriented in all directions. The main trail through the reserve leads up the 20 km (12 mi.) long canyon of the middle-fork of the Talgar River to the Talgar glacier fields, the most extensive glacier fields in the Northern Tian Shan.

Land-Use History. The reserve is one of the oldest protected areas in the Tian Shan, initially having been established in 1931 with an original area of 130 sq. km (50 sq. mi.). The site was designated a nature reserve in 1935 but de-protected in 1951, only to be re-established in 1961. Between 1935 and 1945, the nature reserve reached a maximum size of 10,000 sq. km (3860 sq. mi.), before being reduced in size and divided into several different protected areas after the Second World War. The reserve reached its present delineation in 1983 (UNEP 1991a).

Entry to the Reserve. The entrance to the reserve is fenced off with a ranger's booth sitting just inside the gate. Admission for Kazakh citizens is US \$2.20 per car, and US \$6.00 per car for foreign visitors. Although local citizens are freely admitted to the reserve upon payment of the entry fee, the middle-aged ranger guarding the entrance gate was visibly nervous and evasive when foreign visitors arrived at his post. The ranger proceeded to make the author wait outside the gate for 90 minutes "for the nature reserve director", who, not surprisingly given that it was Sunday, did not put in an appearance. Several carloads of local tourists entered the reserve during this time, and upon being questioned, the ranger stated that foreign visitors required the reserve supervisor's permission and an accompanying guide to visit the reserve, with, presumably, payment of a hefty fee. However, after receiving assurances that the author would make no attempt to visit the Peak Talgar climber's camp, entry was hesitantly granted upon payment of the entrance fee.

Flora. Plant life in the Almaty Nature Reserve is diverse, with 950 species having been observed that are representative of steppe, wet meadow, forest, and alpine ecosystems, including 13 species of trees and 63 species of shrubs. Notable plant species include Schrenk's spruce, willow, birch, wild apple, and wild geranium (UNEP 1991a).

Fauna. Fauna in the reserve is similar to that found in Kyrgyzstan, and includes both woodland and alpine species such as snow leopard, Siberian ibex, elk, roe deer, grey marmot, and two species of pika. Birdlife in the reserve includes golden eagle, lammergeyer, Himalayan snowcock, and chukar.

Recreational Features. The paved road to the entrance gate continues inside the reserve for an additional four kilometers before ending at a small, deteriorating rest camp named Sputnik, which serves as a popular picnicking ground for residents of Almaty, and which has a Soviet-era conference center with guesthouse. Although a trail leads up the middle fork of the Talgar River valley to the climbers' base camp below Peak Talgar, several kilometers from the rest camp the trail becomes extremely overgrown, and clearly has not been maintained since independence. At times the trail completely disappears, forcing hikers to bushwhack through dense vegetation. Given the state of the trail, and the fact that at the time of the author's visit in early September there was not even trampled vegetation to be seen along the route, it appears that few visitors use the trail and that the reserve's rangers spend little time patrolling the upper reserve.

Conservation Issues. While the main entrance to the nature reserve appears to be well guarded against foreign intrusion, the reserve abuts the heavily populated environs of Kazakhstan's largest city, Almaty (population 1.2 million), and the reserve can be reached by car at several places along its northern boundary, or by foot from a number of popular hiking trails beginning on the outskirts of Almaty and elsewhere. Consequently, based primarily on the highly overgrown condition of the reserve's main trail, it is doubtful that the reserve is being adequately patrolled against poaching. Another large, externally controlled issue at the reserve is that of global warming, which is causing the reserves' icefields to melt off at an alarming rate (see Part II, Section B, Subsection 1,

“Glaciers”, pg. 26 above, Blua 2003, Kirby 2003a). Air pollution from Almaty is said to be harming ecosystems in the adjacent Ile-Alatau National Park, and is probably an issue at the Almaty Nature Reserve as well (Kuratov 2003).

Ile-Alatau National Park

Ile-Alatau National Park is located on the north slope of the Zaile Range, about 10 km (6 mi.) south of the city of Almaty, the former capital of Kazakhstan. The park was established in 1996 and has an area of 2023 sq. km (781 sq. mi.) that is contiguous with the western, northern, and eastern boundaries of the Almaty Nature Reserve (Kuratov 2003).

Elevation in the park ranges very roughly from about 1500 m (4900 ft) on the park’s northern boundary to over 4000 m (13,100 ft) along the park’s southern boundary atop the crest of the Zaile Range. Terrain in the park is dominated by steep, north-facing mountain slopes and stream drainages, with extensive glacier fields occurring along the crest of the Zaile Range.

More than 1000 plant species have been identified in Ile-Alatau National Park. This flora includes the most extensive forest belt in the Northern Tian Shan, the upper half of which is dominated by Schrenk’s spruce, while at lower elevations mixed forest occurs with such species as common apricot, Turkestan maple, Sievers’ apple, and Yanchevsky’s currant (Perekhod 2004).

Over 300 mammal and bird species have been observed in the park, including such notable species as snow leopard, Eurasian lynx, brown bear, stone marten, Siberian ibex, ibisbill, lammergeyer, golden eagle, and blue rock thrush (*Monticola solitarius*) (Perekhod 2004).

Being so close to Soviet Central Asia’s second largest city, Ile-Alatau is a heavily visited park which is a popular weekend picnic spot for residents of Almaty. There are two resort complexes with hotels and restaurants in the park at Kokshoky and Medeu, as well as an extensive network of trekking routes through the park which cross the Northern Tian Shan and end at Lake Issyk-Kul in Kyrgyzstan.

Given the proximity of the park to the city, conservation issues are numerous, and include air pollution that adversely affects the park’s forests, and increasing levels of water contamination from both air pollution and automobile related pollutants that run off park roads and into streams. Development in the park is largely unregulated, with persons opening unauthorized eateries and campgrounds inside the park, and, most famously, one party attempting to make an unauthorized jeep track from Almaty to Lake Issyk-Kul. Meanwhile, the park remains afflicted by the more common problems that plague nearly every protected area in the Tian Shan, including poaching; illegal cutting of trees for

firewood; overcollection of medicinal plants, berries and wildflowers; leaving of garbage; and a general lack of funds for enacting environmental protection measures. Rapid melt-off of the park's glaciers resulting from global warming is also a growing problem. (Summarized from Perekhod 2004, Kuratov 2003, Blua 2003, and Kirby 2003a).

2. Western Tian Shan – South Kazakhstan Province

Aksu-Jabagly Nature Reserve (*Zapovednik*)

The Aksu-Jabagly Nature Reserve is located in the province of South Kazakhstan, about midway between the southern Kazakh cities of Shymkent and Taraz. The reserve was established in 1926, and has an area of 751 sq. km (290 sq. mi.) that covers a section of Kazakhstan's West Tian Shan at the point where the Talas, Ugam, and Karatau Ranges all converge.

Elevation in the reserve ranges from about 1100 m (3600 ft) on the southern edge of the open Kazakh Steppe to 4100 m (13,400 ft) atop the crest of the Ugam Range. The mountain topography in the reserve is heavily dissected by four deep river canyons, the most dramatic being the 500 m deep canyon of the Aksu River.

Ecosystems in the reserve include a variety of grassland communities, such as steppe, wet meadows, and alpine meadows, and also sparse juniper and deciduous forest. Notable plant species include wild almond, wild pear, wild rose, Greig's tulip, and three types of junipers.

Fauna in the reserve is said to include 42 mammal and 238 bird species, notably the snow leopard, brown bear, Siberian ibex, Menzbier's marmot, Himalayan snowcock, and Daurian partridge, as well a number of raptors, nine types of reptiles, and two types of amphibians.

Ecotourism activities at the reserve are being promoted, and include birding, horseback riding, camping, and trekking with the following rates:

Reserve Entrance Fee:	US \$7.75 per person per day
Guide Fee:	US \$9.60 per group per day
Horse Rental Fee:	US \$13.25 for 6 hours.

(Summarized from UNEP 2005a, UNEP 2005b, BK 2005).

D. Protected Areas of the Uzbekistan Tian Shan

The protected areas discussed in sections D and E on Uzbekistan and Xinjiang, which follow, were not visited by the author, and are simply summaries of information gathered from a wide array of websites providing information on the region. However in 2004 the author did travel along the entire length of the southern Tian Shan via the cities of Tashkent, Angren, Osh, Kashgar, Kuqa, Turpan, and Hami, and is thus familiar with the region and the staging points for travel to each of the reserves discussed below.

Ugam-Chatkal National Park

Ugam-Chatkal National Park is located at the western terminus of the Tian Shan Range in and below Uzbekistan's northeastern finger, about 60 km (37 mi.) due east of the capital, Tashkent (Map 6). The park was established in 1990, and with an area of 5746 sq. km (2219 sq. mi.), it is by far the single largest protected area in the Tian Shan.

Elevation in the park ranges from roughly 1000 m (3300 ft) just below the Charvak Reservoir to 4300 m (14,100 ft) in the northern Pskem Range. Terrain in the south of the park is dominated by the southwestern end of the Chatkal Range, while to the north, the main geographic feature of the park is the 120 km (75 mi.) long Pskem River Valley, which lies between the parallel Ugam and Pskem ranges.

The park is divided into strictly protected, recreational, and multi-use zones, and within the park there are working farms, grazing lands, and a forestry collective. In 1996, the park had 53 employees and a budget for the year of US \$37,833.

Petroglyphs exist within the park, and there are several trekking routes through the park. Flora, fauna, and conservation issues of Ugam-Chatkal National Park are similar to those of the Chatkal Nature Reserve, discussed below, the territory of the nature reserve being almost entirely surrounded by the southern section of the national park. (Summarized from Khurshut 2003, UNEP 2005a, ENRIN 1996).

Chatkal Nature Reserve (*Zapovednik*)

The Chatkal Nature Reserve is located near the southwestern terminus of the Chatkal Range, between Kyrgyzstan's Besh-Aral Nature Reserve and the Uzbek city of Angren. The reserve was established in 1947 and has an area of 357 sq. km (138 sq. mi.) that is divided into two non-contiguous sections that lie about 18 km apart. The eastern Maydantalu section has a 242 sq. km (93 sq. mi.) core zone that lies on a north facing slope of the Chatkal Range, while the western Bashkyzylsaya section of the reserve has a

111 sq. km (43 sq. mi.) core zone lying on a southern slope of the range. Both sections of the reserve lie within the much larger Ugam-Chatkal National Park.

In 1978 the Chatkal reserve was designated a UNESCO-MAB biosphere reserve due to the high diversity of the reserve's habitats, flora, and fauna, and the reserve was twinned as a cluster biosphere reserve with the Sary-Chelek Nature Reserve in Kyrgyzstan. There are also extensive petroglyphs within the reserve.

Elevations in the Maydantalu section of the reserve range from about 1100 m (3600 ft) on the Terekisay River in the northernmost corner of the reserve to about 4000 m (13,100 ft) along the crest of the Chatkal Range, while the Bashkyzylsaya section of the reserve lies at an intermediate elevation range.

Flora in the reserve includes 1168 plant species with 70 sq. km of meadows and 66 sq. km of forests, including juniper and wild fruit and nut type forests. Fauna observed in the reserve includes 44 species of mammals, 230 species of birds, 16 species of reptiles, two species of amphibians, and more than 3000 species of invertebrates. Notable mammal and bird species at the Chatkal reserve include brown bear, snow leopard, roe deer, Siberian ibex, Menzbier's marmot, stone marten, wild boar, badger, otter, Himalayan snowcock, chukar, golden eagle, booted eagle (*Hieraaetus pennatus*), saker falcon, lammergeyer, and black stork (*Ciconia nigra*).

Conservation issues at the Chatkal Nature Reserve are numerous and include poaching of animals; illegal collection of medicinal plants; illegal collection of wild food plants, such as onions, rhubarb, and mushrooms; illegal collection of wildflowers, including wild tulips; wildfires in both shrub and grassland areas; illegal grazing of livestock inside the reserve; overgrazing adjacent to the reserve's boundaries; and transmission of livestock diseases to wildlife within the reserve, in particular to wild ungulate species.

In 1996 the total budget for the Chatkal Nature Reserve was US \$30,283 and the reserve had 69 staff members: 34 rangers, 14 scientists, and a 21 person administrative staff. (Summarized from Khurshut 2003, UNEP 2005a, UNEP 2005c, UNESCO 2005d, CATWTSBP 2005).

E. Protected Areas of the Xinjiang Tian Shan, China

The eastern half of the Tian Shan Range lies entirely within the territory of western China's Xinjiang Province, consequently, no discussion of conservation in the Tian Shan would be complete without at least a brief look at Xinjiang. From Peak Khan-Tengri at the meeting point of the Kyrgyz, Kazakh, and Chinese borders, to the city of Urumqi, located roughly 600 km (370 mi.) to the east, the Tian Shan continues to be a multi-ridge mountain system nearly 200 km (125 mi.) in width, with high interior plateau basins; a number of long rivers, including the Ili, Tekes, and Kaidu Rivers; and several peaks over 5000 m (16,400 ft) in elevation. The Borohoro Range comes down from the Kazakh border on the north side of the Ili River basin, merging with the Tian Shan midway between the cities of Yining and Urumqi, further increasing the overall width of the mountain belt. East of Urumqi, the Tian Shan continues, for the most part, as a single ridge for about another 600 km (370 mi.) before ending in the plain of the Gobi Desert just east of the northern Silk Road town of Hami.

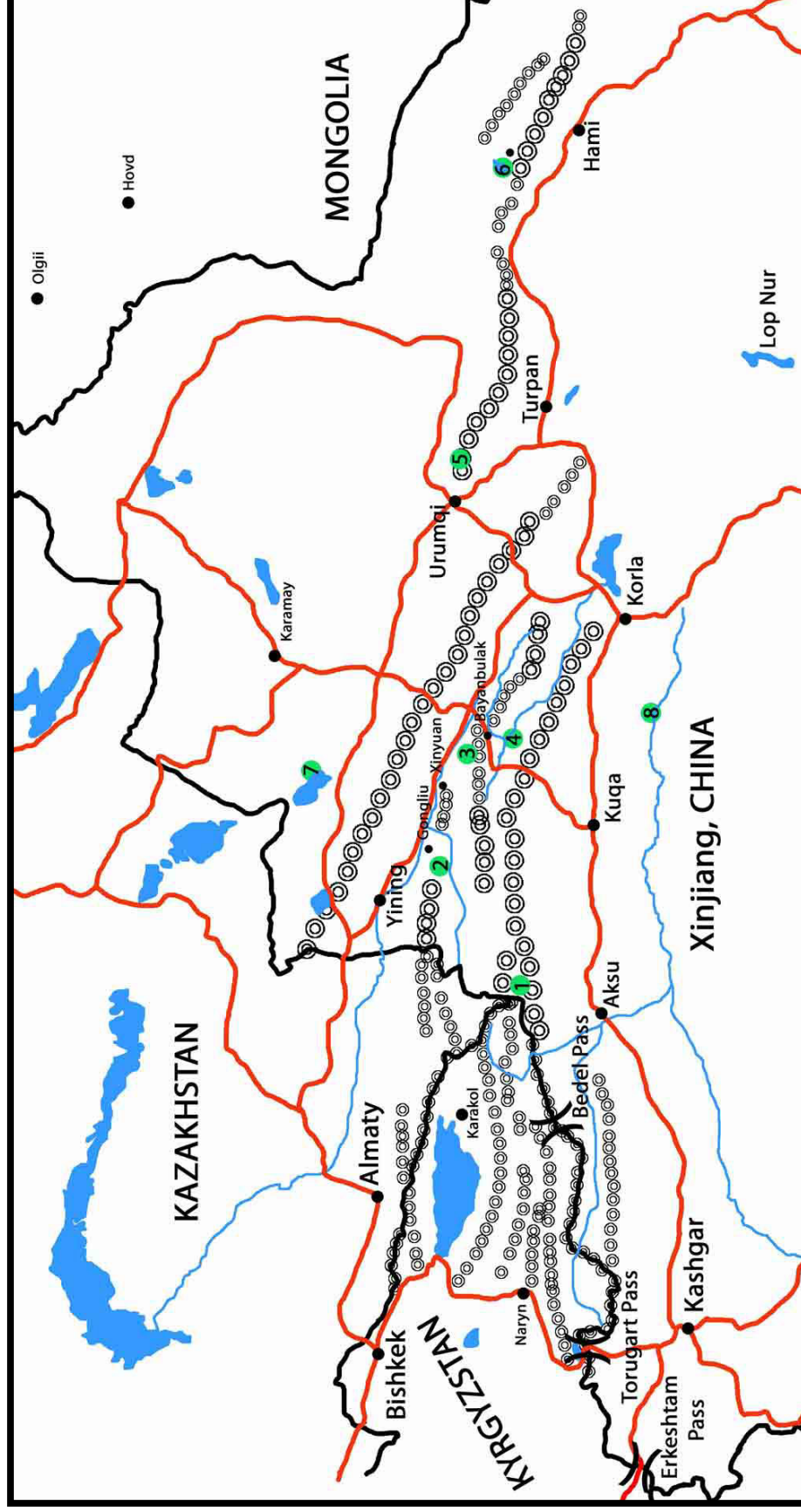
Throughout its length, the eastern Tian Shan is of tremendous economic as well as ecologic importance for northern Xinjiang. The Silk Road towns on the edge of the Taklimakan Desert in the northern Tarim Basin all owe their existence to precipitation captured by the high crest of the Tian Shan. This precipitation then enters mountain streams, descending several thousand meters in elevation, before finally reaching many communities via an ancient system of karez wells - long, hand-dug, underground tunnels which conduct water from the base of the mountains to fields and villages in the

desert plain, a water delivery method that is also used in Afghanistan and Iran. Ecologically, the range continues to provide an island of well-watered habitat for relict conifer forests and meadows, even as far east as Lake Barkol, near Hami, at the meeting point of the Gobi, Taklimakan, and Gurbantunggut Deserts.

While information on the current status of both national and provincial level protected areas in the Xinjiang Tian Shan is hard to come by, an attempt to briefly summarize internet sources on the six most prominent protected areas in the eastern Tian Shan is made below (Map 7, Table 16).



Front range of the Tian Shan in the northern Taklimakan Desert between the cities of Kashgar and Aksu, Xinjiang, China.



Map 7. Protected Areas of the Xinjiang Tian Shan, China. Major roadways shown in red.

- | | | |
|-------------------------------------|-------------------------------------|----------------------------------|
| 1. Tuomuer Peak Nature Reserve | 4. Bayanbulak Swan Nature Reserve | 7. Ganjia Hu Lake Nature Reserve |
| 2. Western Tian Shan Nature Reserve | 5. Bogeda Peak Nature Reserve | 8. Tarim Wetlands Nature Reserve |
| 3. Middle Tian Shan Nature Reserve | 6. Eastern Tian Shan Nature Reserve | |

Tuomuer Peak Nature Reserve
(Chinese: Tuomuer Feng)

Latitude: 42° 7' 9" N (42.119°), **Longitude:** 80° 22' 23" E (80.373°)

Tuomuer Peak Nature Reserve is an IUCN Category V, national level nature reserve located in Xinjiang's Aksu Prefecture, about 600 km (370 mi.) west of Urumqi, the capital of Xinjiang Province. Again, Tuomuer Feng is known in Soviet Central Asia as either Peak Pobeda in Russian or Jengish Chokusu in Kyrgyz, and the mountain straddles the easternmost section of Kyrgyzstan and China's shared border. At 7439 m (24,400 ft) in elevation, Tuomuer is the highest peak in the Tian Shan. The reserve is accessible from the city of Aksu, located 445 km (276 mi.) east of Kashgar.

The Tuomuer Peak Nature Reserve was established in 1990 and has an area of 2376 sq. km (917 sq. mi.). Elevation in the reserve ranges from about 2000 m to 7439 m (6600 to 24,400 ft) at the summit of Tuomuer Peak. Grassland ecosystems dominate the reserve, however there is some limited forest cover. The most extensive glacier fields in the Tian Shan are centered around Tuomuer Peak (see Part II, Section B, Subsection 1, "Glaciers", pg. 26 above). Birdlife of note includes greater spotted eagle (*Aquila clanga*), imperial eagle (*Aquila heliaca*), and Great Bustard (*Otis tarda*). Presumably the reserve also has excellent alpine habitat for snow leopard, Siberian ibex, and argali. (Summarized from UNEP 2005a, BLI 2003).

Western Tian Shan Nature Reserve
(Chinese: Xitianshan)

Latitude: 43° 23' 21" N (43.389°), **Longitude:** 82° 1' 53" E (82.032°)

The Western Tian Shan Nature Reserve is an IUCN category V, national level nature reserve located in Xinjiang's Yili Prefecture, about 20 km (12 mi.) southwest of the town of Gongliu, which itself is situated about 400 km (250 mi.) west of Urumqi. The reserve has an area of 312 sq. km (120 sq. mi.) and is classified as a "priority grassland and desert ecosystem" in China's 1994 Biodiversity Conservation Action Plan. The reserve lies on the north slope of a mountain ridge lying between the Kunes and Tekes Rivers, and ranges in elevation from roughly 1000 to 2600 m (3300 to 8500 ft) in elevation. (Summarized from NEPA 1994, UNEP 2005a).

Bayanbulak Swan Nature Reserve
(Chinese: Bayinbuluketiane)

Latitude: 42° 47' 52" N (42.798°), **Longitude:** 84° 5' 6" E (84.085°)

The Bayanbulak Swan Nature Reserve is an IUCN Category V, national level nature reserve located in Xinjiang's northern Bayangol Mongolian Autonomous Prefecture. The reserve lies near the town of Bayanbulak in the Tian Shan's marshy, 23,000 sq. km (8900 sq. mi.) Yurdus Basin, about 175 km (110 mi.) by road north of the Tarim Basin town of Kuqa, or roughly 300 km (190 mi.) west of Urumqi.

The Bayanbulak reserve has an area of 1487 sq. km (574 sq. mi.) and was established in 1986 with the primary goal of protecting the threatened whooper swan (*Cygnus cygnus*) and other waterfowl that inhabit the basin. Elevation in the reserve ranges from 2200 to 2430 m (7200 to 8000 ft), however the mountain ranges encircling the Yurdus basin rise to over 4000 m (13,100 ft). The Yurdus Basin itself is drained by the Kaidu River, which flows into the Tarim Basin.

Flora of the reserve's marshlands is dominated by reeds (*Phragmites communis*) and sedge grass (*Carex muliensis*). Plant species found at the waters edge include cattails (*Typha latifolia*), rushes (*Scirpus validus*), and sorrel (*Rumex spp.*). Drier areas surrounding the wetlands consist of grasslands devoid of trees and shrubs, but contain nut grass, a favorite food of swans (UNEP 1991).

The reserve is occupied at various times of the year by 128 species of birds, 25 of which are nationally protected, with a total estimated waterfowl population of 100,000. Notable bird species at Bayanbulak include an estimated 5000-7000 whooper swans (*Cygnus cygnus*), 4000 common cranes (*Grus grus*), and 4000 Demoiselle cranes (*Anthropoides virgo*), as well as black stork (*Ciconia nigra*), whistling swan (*Cygnus columbianus*), mute swan (*Cygnus olor*), bar-headed goose (*Anser indicus*), great egret (*Egretta alba*), horned grebe (*Podiceps auritus*), great cormorant (*Phalacrocorax carbo*), brown-headed gull (*Larus brunnicephalus*), mallard (*Anas platyrhynchos*), common redshank (*Tringa tetanus*), Pallas's fish-eagle (*Haliaeetus leucoryphus*), imperial eagle (*Aquila heliaca*), and cinereous vulture (*Aegypius monachus*).

Notable mammals inhabiting the reserve include grey wolf (*Canis lupus*) and corsac fox (*Vulpes corsac*), both of which prey on waterfowl.

The area around the reserve is difficult to access, and consequently only sparsely populated by Mongolian herders who believe swans to be angelic symbols of loyalty and good fortune, a belief which contributes to their protection (UNEP 1991b). Reserve regulations prohibit hunting or removal of swans, and regular patrols are made during the molting period to prevent swans from being disturbed by both humans and predators, while local police actively investigate cases of swan harassment. The reserve is administered by the Bazhou Forestry Department but overseen by the Environmental

Protection Agency. (Summarized from Ramsar 2001, UNEP 1991b, UNEP 2005a, BLI 2003).

Middle Tian Shan Gongnaisi Alpine Meadow Nature Reserve
(Chinese: Tianshan Zhongbu Gongnaisi Caodian)

Latitude: 43° 14' 24" N (43.240°), **Longitude:** 83° 56' 59" E (83.950°)

The Middle Tian Shan Gongnaisi Alpine Meadow Nature Reserve is an IUCN Category V nature reserve located in Xinyuan County, Yili Prefecture, roughly 200 km (125 mi.) east of the city of Yining, or about 80 km (50 mi.) northwest of the Bayanbulak Swan Nature Reserve, discussed above. The reserve was established in 1986 and has an area of 667 sq. km (258 sq. km), the goal of which is to protect montane meadow and desert ecosystems. (Summarized from UNEP 2005a, Hu 2001).

Bogeda Peak Biosphere Reserve
(including Tianchi Nature Reserve and Lake Tianchi Natural Landscape Reserve)

Latitude: 43° 56' 56" N (43.949°), **Longitude:** 88° 10' 2" E (88.167°)

The Bogeda Peak Biosphere Reserve is located on the southern edge of the Junggar Basin, in Xinjiang's Maoji Huizu Autonomous Prefecture, about 50 km (31 mi.) east of the city of Urumqi. The reserve is a UNESCO-MAB biosphere reserve that was designated in 1990, and composed of two separate administrative units, the Fukang Desert Ecological Center of the Chinese Academy of Sciences and the Tianchi Nature Reserve, which itself has a further subunit, the Tianchi Lake Natural Landscape Reserve. The Tianchi Nature Reserve is an IUCN Category V, national level nature reserve that was established in 1980 with an area of 381 sq. km (147 sq. mi.), while its subunit, the Tianchi Lake Natural Landscape Reserve, has an area of 158 sq. km (61 sq. mi.) centered around the 3.3 km (2 mi.) long Lake Tianchi. The much larger Bogeda Peak Biosphere Reserve has a total area of 1287 sq. km (470 sq. mi.) subdivided into three zones, a 487 sq. km (188 sq. mi.) core zone, a 400 sq. km (154 sq. mi.) buffer zone, and a 400 sq. km transition zone.

The elevation range in the reserve is extremely wide, varying from a low of 450 m (1480 ft) on the southern edge of the Gurbantunggut Desert to a high of 5445 m (17,860 ft) on the summit of Bogeda Peak, while Lake Tianchi itself sits at an elevation of 1910 m (6265 ft). Thus terrain in the reserve is dominated by the slopes of Bogeda Peak which rise 5000 m above the plain of the Junggar Basin.

Consequently, ecosystem types within the reserve are a function of elevation and are extremely diverse. These ecosystems include glacier, alpine meadow, mixed conifer and deciduous forest, shrubland, steppe, desert, and sand dune ecosystems. Above 3100 m (10,200 ft) in elevation, plant life is dominated by tundra-type vegetation, particularly cushion plants. Alpine and sub-alpine meadows occur from 2000 to 2900 m (6600 to 9500 ft), with such plant species as *Kobresia capilliformis*, *Polygonum viviparum*, *Thalictrum alpinum* and *Potentilla gelida*. Mid-mountain forest-meadow landscapes are found from 1600 to 2700 m (5200 to 8900 ft), and are characterized by *Bromus inermis*, *Calamagrostis epigeios*, and *Alchemilla erythropleura*, with mixed conifer-deciduous forest dominated by Schrenk's Spruce (*Picea schrenkiana*) that rings Lake Tianchi. Mountain steppe and desert steppe occur from 1100 to 1700 m (3600 to 5600 ft), which are dominated by grass species such as *Stipa capillata* and *Festuca sulcata*. Ecosystems in the lowest areas of the reserve, from 450 to 1000 m (1500 to 3300 ft) in elevation, include upper alluvial plains with *Artemisia abrotanum*, a middle alluvial plain shrub desert zone with *Reaumuria soongorica*, and a lower alluvial plain desert zone characterized by *Suaeda physophora*, *Kalidium caspicum*, and *Kalidium foliatum* as well as saxaul shrubs (*Haloxylon* spp.) (UNESCO 2002).

Mammal and bird species found in the reserve are said to include snow leopard, brown bear, elk, Eurasian lynx, badger, chukar, griffon, Pallas's fish-eagle (*Haliaeetus leucoryphus*), greater spotted eagle (*Aquila clanga*), and imperial eagle (*Aquila heliaca*) (CCO 2003, BLI 2003).

A large human population lives in the reserve, including 4000 people permanently residing in the core area, 10,000 in the buffer zone, and 120,000 in the transition area. The reserve is an easy daytrip from Urumqi (population 1.1 million), and in 2001 some 350,000 tourists visited the reserve. One particularly popular attraction at Bogeda is a Taoist temple located on the shore of Lake Tianchi (UNESCO 2002).

In July 2001, the Xinjiang Tourism Administration announced plans to develop nine major tourist centers in Xinjiang, one of which is the Lake Tianchi reserve. Under this program plans were announced to build a new road across the Bogeda Range of the Tian Shan from Lake Tianchi to the town of Dabancheng, located 80 km (50 mi.) southeast of Urumqi, providing southerly access to the lake which previously could only be reached from a road to the north. The stated purpose of the plan was to provide more convenient transportation facilities so that tourists will enjoy more pleasant, more comfortable, and safer trips (People's Daily 2001). (Summarized from UNESCO 2002, UNEP 2005a, BLI 2003, CCO 2003, People's Daily 2001).

Eastern Tian Shan Nature Reserve
(including Lake Barkol, Chinese: Balikun Hu)

The Eastern Tianshan Nature Reserve is located in Hami Prefecture, about 400 km (250 mi.) east of Urumqi and 80 km (50 mi.) north of the city of Hami. The reserve is a listed in China's Biodiversity Conservation Action Plan as a "priority grassland and desert ecosystem" and a reserve of "national significance" (NEPA 1994).

The center piece of the reserve is Lake Barkol, a saline lake that sits at an elevation of 1585 m (5200 ft), which is 12 km (7.5 mi.) in length and has an area of 112 sq. km (43 sq. mi.) (Government of China 2005). The Karlik Range lies just south of Lake Barkol, where it forms the easternmost extension of the Tian Shan, rising to a maximum elevation of 4265 m (13,990 ft) on the summit of Yueya Mountain located about 50 km (30 mi.) southeast of the lake.

Ecosystems in the reserve include both meadows and a forest belt of Schrenk's spruce on the north facing slopes of the Karlik Range, while arid grasslands and desert ecosystems dominate the north side of the lake. Notably, Lake Barkol represents the easternmost extent of Schrenk's spruce in the Tian Shan. From the lake eastward to the end of the Karlik Range and the Tian Shan, Schrenk's spruce gives way to relict belts of Siberian larch (*Larix sibirica*), the dominant tree cover of Mongolia's northern forests, located far to the north across the Gobi Desert (Zhang 2004).

The lake, with its grasslands and forests, is a popular summering ground for yurt-dwelling Kazakh herders, as well as being a popular tourist destination accessible as a daytrip from the city of Hami, located on the main transportation corridor from eastern China to the cities of Urumqi and Kashgar in western Xinjiang. In July 2001 the Xinjiang Tourist Administration announced plans to improve tourist facilities in the Tian Shan Mountain area, including undertaking projects at "Bagrch Kol" Lake, presumably Lake Barkol (People's Daily, 2001). In general, in the Chinese context "improving tourist facilities" in protected areas generally involves building paved highways through reserves that are serviced by frequent shuttle buses, and also the construction of large, multi-story, higher-end hotel complexes with restaurants and gift shops. (Summarized from NEPA 1994, Government of China 2005, Zhang, 2004, People's Daily 2001).

In addition to the national level protected areas discussed above, there are also numerous areas protected at the provincial and county levels in the Xinjiang Tian Shan, which are generally smaller than national level protected areas. A number of important protected areas can also be found in the lowland areas along the base of the Tian Shan mountain belt, such as the Ganjiahu Lake Nature Reserve, 175 km (110 mi.) northeast of Yining, which is noted for its extensive saxaul (*Haloxylon ammodendron*) cover, and the Tarim Wetlands Nature Reserve, 375 km (230 mi.) southwest of Urumqi, which is notable for its riparian forest of Euphrates poplar (*Populus euphratica*).

Table 16. Protected Areas of the Kazakhstan, Uzbekistan, and Xinjiang Tian Shan

Country	Name	Area (sq. km)	IUCN Category	Location
Kazakhstan	Almaty Nature Reserve	733	Ia	Almaty Province
Kazakhstan	Ile-Alatau National Park	2023	II	Almaty Province
Kazakhstan	Aksu-Jabagly Nature Reserve	744	Ia	South Kazakhstan Province
Uzbekistan	Chatkal Nature Reserve	357 (in two sections)	Ia	Tashkent Province
Uzbekistan	Ugam-Chatkal National Park	5746	II	Tashkent Province
China	Tuomuer Peak Nature Reserve	2376	V	Aksu Prefecture, Xinjiang
China	Western Tian Shan Nature Reserve	312	V	Yili Prefecture, Xinjiang
China	Middle Tian Shan Gongnaisi Alpine Meadow Nature Reserve	667	V	Yili Prefecture, Xinjiang
China	Bayanbulak Swan Nature Reserve	1487	V	Bayangol Mongolian Autonomous Prefecture, Xinjiang
China	Bogeda Peak Nature Reserve (Lake Tianchi)	1287	V	Maoji Huizu Autonomous Prefecture, Xinjiang
China	Eastern Tian Shan Nature Reserve (Lake Barkol)	No Data	No Information	Hami Prefecture, Xinjiang

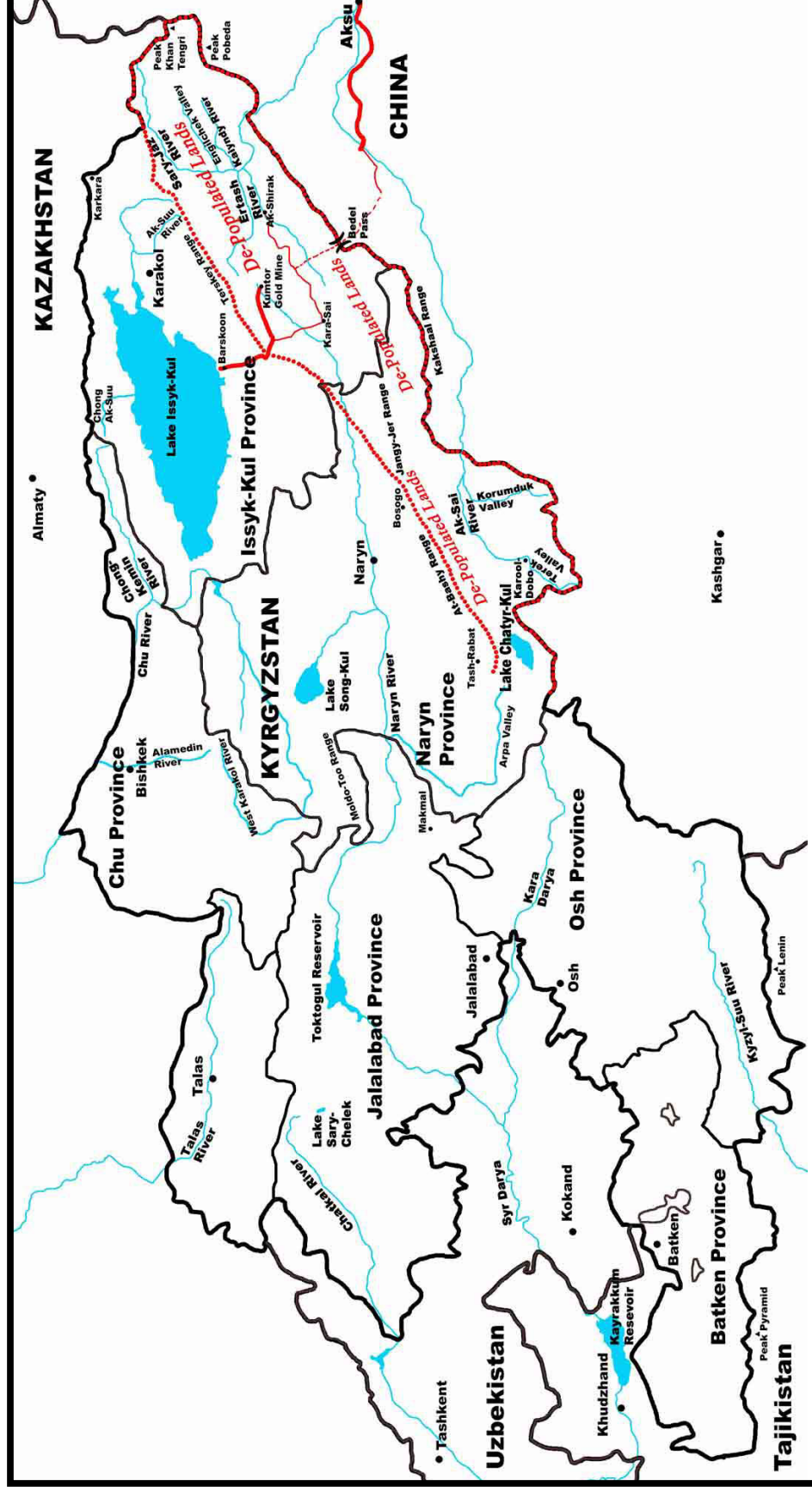
Sources: UNEP 2005a, NEPA 1994.

PART V.

Potential Sites for Creation of New Protected Areas in Kyrgyzstan

- A. De-Populated Lands**
- B. Other Potential sites in the Kyrgyzstan Tian Shan for Protected Areas**
- C. Currently Proposed Protected Areas in Kyrgyzstan**
- D. Possibilities for Creation of Transboundary Protected Areas**

Part V - Potential Sites for New Protected Areas in Kyrgyzstan



Map 8. De-Populated Lands and other Potential Conservation Lands. **Dotted red line:** Lands largely de-populated since collapse of the collective system in the mid-1990s. **Thick red line:** Barskoon - Kumtor Gold Mine Road. **Thin red line:** Barskoon – Kara-Sai – Ak-Shirak Road (closed January to April). **Dashed red line:** Bedel Pass jeep track, possible site of a new international highway.

Part V of this report provides an overview of sites in Kyrgyzstan that merit consideration for protected status. Although the focus of the section is on the Kyrgyzstan Tian Shan, a brief overview of potential sites for protected areas in the Pamir-Alai is also given. Section A on de-populated lands is based, for the most part, on the author's site visits to remote areas of eastern Kyrgyzstan situated along the Chinese border. Sections B and C on other potential and proposed protected areas in Kyrgyzstan are based on conversations with Emil Shukurov, the scientific adviser to the GEF Central Asia Transboundary West Tien-Shan Biodiversity Project (Appendix P). Section D discusses the potential for creating international parks or biosphere reserves on Kyrgyzstan's mountainous borders. See Map 8 for locations of sites discussed below.

A. De-Populated Lands

As touched upon in the above section on the Sarychat-Ertash Nature Reserve, the breakup of the Soviet system of herding collectives and the end of all state support for semi-nomadic livestock herders in the early 1990s led to the de-population of vast swaths of the remote Kyrgyz highlands along the Chinese Border (see Appendix A). The exodus of herders from these areas was followed by an ongoing process of "de-development", by which roads into these remote border lands have not been maintained since independence and are quickly becoming impassable due to blockage by avalanche and landslide debris, washing out of bridges and culverts, and erosion of the roadbeds themselves. As a result, a roughly 70 km (45 mi.) wide swath of the Kyrgyz Tian Shan immediately north of the Chinese border, from Lake Chatyr-Kul in the west to the ice fields of Peak Pobeda and Peak Khan-Tengri in the east, has now been largely de-populated. In the absence of herding and other human activities, many of these areas are reverting to wilderness.

These paired processes of de-population and de-development, can provide potentially large benefits to biodiversity conservation efforts in the region by permitting the creation of new protected areas on disused lands. All along the Sino-Kyrgyz frontier, one excellent indicator of potential sites for the creation of new reserves to protect large fauna is the location of commercial big game hunting camps, many of which are located in the de-populated border regions of Naryn and Issyk-Kul Provinces.

Moving from west to east in Naryn Province, commercial hunting camp concessions specializing in argali hunts can be found in the Arpa Valley west of Lake Chatyr-Kul, in the Ak-Sai Valley, and in the Jangy-Jer Range. The Ak-Sai Valley is a broad, high, grassland valley, with a median elevation along the Ak-Sai River of about 3200 m (10,500 ft). Tributaries on the south side of the valley that are said to have large populations of argali and ibex include the Terek Valley, which has some hunting concessions around the former settlement of Karool-Dobo, and the Korumduk Valley further to the east. In the Korumduk Valley, 565 argali were sighted during a three-week count in the summer of 1993, and the valley at that time was described by A.K.



De-populated area of the remote Ak-Sai Valley with the Kakshaal Range, which forms the Chinese Border, in the background. Naryn Province, Kyrgyzstan.

Fedosenko as being a “reserve”, although it appears that this “reserve” was a private hunting concession that was actively patrolled to keep out unauthorized hunters (Fedosenko 1993). Today, the Kokalator Goldmine is located at the mouth of the Korumduk Valley. Continuing eastward, more hunting concessions are to be found in the Jangy-Jer Range, as is the At-Jailoo “provincial wildlife sanctuary”, which has a 5-year mandate ending in 2008 (see Part V, Section A, Subsection 4, “Wildlife Sanctuaries”, pg. 91 above).

In the de-populated borderlands of Issyk-Kul Province, there are a number of hunting concessions in the Ak-Shirak watershed, which, as discussed above, virtually surround as well as occupy the Sarychat-Ertash Nature Reserve. The remote north slope of the Kakshaal Range, located south of the Kara-Sai/Ak-Shirak Highway holds some potential for creation of protected areas, although again the much rumored Bedel Pass highway and the new gold mine just south of the settlement of Ak-Shirak may threaten the ecologic integrity of the area. East of Ak-Shirak, the remote valleys of the lower Sary-Jaz, Kaiyndy, and Engilchek Rivers are all said to have abundant wildlife and excellent potential for the creation of nature reserves.



Peak Khan-Tengri, elevation 6995 m, the most sacred mountain in Central Asia.
Photo by Pavel Van-Yu-Tsai

To the outside observer, it may seem remarkable that the eastern Engilchek Valley has no protected status whatsoever. The valley is the site of the highest peak in the Tian Shan, Peak Pobeda; the second highest and most sacred peak in the Tian Shan, the pyramidal, 6995 m (22,944 ft) high Peak Khan-Tengri (English: *Lord of the Heavens*); the longest valley glacier in Kyrgyzstan, the 50 km (30 mi.) long Engilchek Glacier; the Merzbacher Lakes, a pair of icebound lakes several kilometers in length atop the Engilchek glacier that are studded with icebergs; and the largest ice fields in the Tian Shan. The area is a mecca for mountaineers and tourists on scenic helicopter flights, with helicopters landing at the Peak Pobeda base camp twice per week during summer.

The Engilchek valley is also a popular trekking destination and at least one hunting camp has a concession in the valley. While the Engilchek Valley would be the premier national park of most nations, the valley remains unprotected at this point in time, in large part because of mineral deposits in the area, including a Soviet-era tin mine near the town of Engilchek, and a number of recent gold finds.

In a note on wildlife, these same de-populated areas in eastern Kyrgyzstan not only harbor the large numbers of argali and ibex that support Kyrgyzstan's commercial hunting industry, but are also said to harbor Kyrgyzstan's last substantial populations of snow leopard, Tien Shan brown bear, and Pallas's cats.

B. Other Potential Sites for Protected Areas in the Kyrgyzstan Tian Shan



The eastern At-Bashy Range near the Bosogo Camp, At-Bashy River valley, Naryn Province.

Other potential sites for new national parks in Kyrgyzstan include the majestic pyramidal spires of the At-Bashy Range in Naryn Province, with possibilities at both range's eastern end, near the forests and mineral springs of the Bosogo camp, as well as at the western end of the range, particularly in the vicinity of the heavily touristed Tash-Rabat Valley, with its ancient stone caravanserai and trekking route to Lake Chatyr-Kul.



15th Century Tash-Rabat Caravanserai, western At-Bashy Range, Naryn Province.

Other scenic valleys suitable for new national parks or extensions of Chu Province's Ala-Archa National Park include the Alamedin Canyon and mineral springs located in the Kyrgyz range immediately to the east of Ala-Archa Canyon, which is a popular summer weekend spot with Bishkek residents, and the upper West Karakol River valley in the Suu-Samyr basin located immediately to the south of Ala-Archa across the Kyrgyz Range. The Alp-like Ak-Suu Valley just east of the Teplokluchenka Wildlife Sanctuary in Issyk-Kul Province also has a popular mineral spring resort, and an extremely scenic forested valley lined with snow capped peaks that is ablaze with wildflowers in spring and worthy of some form of protected status.

Two remote areas with high wildlife habitat value and excellent potential for designation as nature reserves are the Moldo-Too Range, immediately west of Lake Song-Kul, and the Makmal area on the east slope of the Ferghana Range, near Saimaluu-Tash National Park in the southwest corner of Jalalabad Province. Both sites are said to provide excellent habitat for snow leopard, brown bear, dhole, Eurasian lynx, and roe deer. However, at present creation of a nature reserve in the Makmal area is hindered by the presence of a significant gold deposit.

C. Currently Proposed Protected Areas in Kyrgyzstan

At present there are currently five protected areas and one international biosphere reserve that have reached the proposal stage and are currently under study for designation by the government of the Kyrgyz republic.

Of the five proposed national level protected areas, four are in the Pamir-Alai Range of southern Kyrgyzstan, including three in Batken Province and one large reserve that will cover much of the crest of the Alai Range in Osh Province. The fifth proposed protected area is in easternmost Issyk-Kul Province and will protect a large tract of the central Tian Shan lying along the Kyrgyz Republic's shared border with Kazakhstan, between the Karkara border post and the Sary-Jaz Valley, much of which is already nominally protected in the Tup Wildlife Sanctuary (*zakaznik*).

An international biosphere reserve has been proposed for designation under the UNESCO-MAB program that will cover the entire West Tian Shan region from about the Toktogul Reservoir in the Kyrgyz Republic's Jalalabad Province to the foothills of the Tian Shan on the outskirts of Tashkent, Uzbekistan, and will include portions of the West Tian Shan in both Kazakhstan and the Kyrgyz province of Talas. This biosphere designation is currently the focus of two large internationally funded conservation projects in Kyrgyzstan, the GEF funded "Central Asia Transboundary West Tien Shan Biodiversity Project", and the TACIS funded "West Tian Shan Biodiversity Conservation Project". For information on these and other ongoing conservation projects in the Tian Shan, see Appendix P.

D. Possibilities for Creation of Transboundary Protected Areas

In addition to the proposed West Tian Shan international biosphere reserve mentioned above, there are several other sites in Kyrgyzstan with excellent potential for creation of international protected areas or biosphere reserves.

The most outstanding possibility for the creation of an international protected area would be the establishment of a three-nation reserve centered around Peak Pobeda, the highest peak in the Tian Shan. As discussed in Section A of this part, the scenic wonders of the Peak Pobeda/Peak Khan-Tengri Massif are much in need of protection in both Kyrgyzstan and Kazakhstan. If protected areas of some sort are established in these two nations, they could be joined with the already existing Tuomuer Peak Nature Reserve in Xinjiang to form an international reserve (see Part IV, Section E, “Tuomuer Peak”, pg. 105 above).

A second possibility for establishment of an international park is in the Zaile and Kungoy Ranges of the Northern Tian Shan in Kazakhstan and Kyrgyzstan respectively. Here, a portion of the Kyrgyz Republic’s Chong-Kemin National Park is already contiguous with the Ile-Alatau National Park in Kazakhstan, which itself surrounds the Almaty Nature Reserve. If the scenic Chong-Ak-Suu Valley in Issyk-Kul Province, located immediately east of Chong-Kemin, were to be protected, these four protected area units could be combined into a large international park and nature reserve to protect the highest section of the Northern Tian Shan. At present, the area is already used as a de facto international park by the many trekkers hike between the two nations each summer.

Another area with potential for creation of international park or reserve is the Peak Lenin Massif, elevation 7134 m (23,400 ft), which is located in Kyrgyzstan’s Osh Province on the shared border between the Kyrgyz Republic and Tajikistan. Peak Lenin is the second highest peak in the Tian Shan and already a popular destination for mountain climbers. A fourth possibility is creation of an international park centered around the 5509 m (18,070 ft) high Pyramid Peak, which is located on the Kyrgyz-Tajik border in the Kyrgyz province of Batken. The valleys around Peak Pyramid have what are said to be some of the most dramatic alpine scenery and best big wall climbing to be found anywhere in Asia, and the area is a popular destination for rock-climbers, in spite of incursions by militants of the Islamic Movement of Uzbekistan into the area in 1999, 2000, and 2001.

In addition to these four areas, there are probably several more areas in the Kakshaal Range on the border between eastern Kyrgyzstan and China that would make excellent sites for international game reserves for argali, ibex, and other species.

PART VI.

Recommendations and Conclusions

A. Recommendations

- 1. Recommendations Implementable by Individual Protected Areas**
- 2. Recommendations Implementable by the Provincial and National Governments of the Kyrgyz Republic**

B. Conclusions

A. Recommendations

The following recommendations are provided as a set of basic, initial suggestions for improving the management of Kyrgyzstan's protected areas, so that these natural reserves may one day achieve their stated objectives of protecting the nation's wild flora, fauna, and scenic natural beauty for the benefit of future generations of Kyrgyz citizens.

Recommendations are divided into two broad groups: 1) those recommendations that can be carried out by the staff of individual protected areas, and 2) recommendations that will need to be implemented by agencies of either the provincial or national governments.



"The snow leopard – pride of the reserve, listed in the Red Book"

Sign in the Almaty Nature Reserve, Northern Tian Shan, Kazakhstan.

1. Recommendations Implementable by Individual Protected Areas

- Post signs on protected area boundaries;
 - Post signs marking closed core zone boundaries;
 - Ban firearms in protected areas;
 - Increase frequency of patrols;
 - Encourage information sharing between protected areas;
 - Restrict motor vehicle access;
 - Develop management plans for wildlife sanctuaries.
-
- **Post Signs on Protected Area Boundaries.** Post signs notifying visitors that they are entering a protected area at the main entrance to these areas and at each regularly used side entrance, including all jeep tracks and trails. List the main protected area prohibitions on hunting, woodcutting, fires etc. on each entrance sign. Post signs in Kyrgyz, Russian, and English.
 - **Post Signs Marking Closed Core Zone Boundaries.** Post signs marking boundaries between closed zones, such as fully protected core zones in parks and nature reserves, and protected multi-use zones.
 - **Ban Firearms in Protected Areas.** Prohibit firearms in protected areas and enforce this ban. Nearly all protected areas in the Kyrgyz Republic are occupied by semi-nomadic herders for several months each summer, many of whom routinely carry rifles for the purpose of killing wolves they feel are threatening their livelihoods. However, given the state of extreme deprivation many of these herders live in, the temptation to shoot any other animal they come upon for meat


or sale of parts is all too large, and firearms should not be allowed inside protected areas.

- **Increase Frequency of Patrols.** Increase frequency of park patrols and increase the amount of territory patrols can cover by providing rangers with, and teaching them the use and care of, basic trekking equipment, such as modern lightweight stoves, tents, and sleeping bags.
- **Encourage Information Sharing between Protected Areas.** Encourage cooperation and sharing of information between staff members of adjacent protected areas by arranging meetings at predetermined intervals, such as spring and fall, so that information concerning issues of management, law enforcement, and ecology can be exchanged between neighboring protected area units. At present, there is extremely little communication between staff members of neighboring protected areas.
- **Restrict Motor Vehicle Access.** Restrict motor vehicle access beyond protected area recreation zones to reserve staff only, such as by placement of gates across roads in protected areas that should be closed to the general public.
- **Develop Management Plans for Wildlife Sanctuaries.** Develop and implement management plans for individual wildlife sanctuaries (*zakazniki*) in order to increase their effectiveness in protecting wildlife.

2. Recommendations Implementable by the Provincial and National Governments of the Kyrgyz Republic

- Expand size of protected areas;
 - Join territories of adjacent protected areas;
 - Create new protected areas;
 - Regulate hunting camps to improve conservation;
 - Charge hunting camps a conservation fee;
 - Enforce existing laws concerning protected areas;
 - Increase transparency of government decisions affecting protected areas;
 - Prohibit mineral exploration and extraction in protected areas;
 - Create an on-line national protected area database;
 - Ratify the UN CITES convention.
-
- **Expand Size of Protected Areas.** Expand the territory of all protected areas in Kyrgyzstan. At present all protected areas in the nation are too small to effectively protect healthy populations of large, highly specialized, mammal species such as snow leopards, argali, and Siberian ibex, all of which require large home ranges.

Thus individual protected areas will need to be greatly enlarged if they are to be effective in protecting these species.

- **Join Territories of Adjacent Protected Areas.** Expand protected area territory by connecting boundaries of adjacent protected areas to form larger multi-unit protected areas. This could easily be done in the protected areas of the eastern Terskey Range and in the Lake Song-Kul area. At present, the Teplokluchenka Wildlife Sanctuary, Karakol National Park, the Jeti-Oguz Wildlife Sanctuary, and the Sarychat-Ertash Nature Reserve are adjacent to each other, but non-contiguous, each being separated from the next by the crests of high mountain ridges that are, oddly, unprotected. The same is true for the two northern units of the Karatal-Japyryk Nature Reserve, Lake Song-Kul and the Karatal River canyon, which are separated by a 15 km (9 mi.) wide segment of unprotected ridgeline that could easily be incorporated into the reserve's managed, multi-use, buffer area.
- 
- Unprotected crest of the Terskey Range which separates the Teplokluchenka Wildlife Sanctuary, Karakol National Park, and the Sarychat-Ertash Nature Reserve.
- **Create New Protected Areas.** The entire protected area system of the Kyrgyz Republic needs to be expanded, as well as the individual parks themselves. At present only about five percent of national territory is nominally protected, while a fairly common goal internationally is that of protecting about 10 percent of a nation's territory in national parks and nature reserves. While protecting 10 percent of the nation would be an outstanding achievement, these lands should be in areas of high conservation value. Lands for inclusion in the protected area system, need to be chosen in such a way as to create continuous corridors of mountain habitat in order to provide maximum protection for rare species that disperse and migrate over long distances in the Tian Shan and neighboring ranges - as opposed to simply being a collection of small, highly isolated protected areas, such as exists in Kyrgyzstan today.
 - **Regulate Hunting Camps to Improve Conservation.** Legislate regulations requiring increased coordination between hunting camps and protected area biologists so that biologists can give input on areas, such as lambing grounds, where hunting should be prohibited outright, and so that biologists can examine, or at least obtain information on, animals taken by trophy hunters in their areas.
 - **Charge Hunting Camps a Conservation Fee.** While hunting permits for argali cost US \$5000, and one-week commercial hunting trips run anywhere from US \$15,000 to US \$30,000, none of this money directly benefits the protected areas that provide a safe haven for argali so that the population of this species does not decrease any further in the Kyrgyz Republic. At present hunting permit funds

are disbursed directly to provincial and national governments. The author proposes that either US \$1000 from each argali hunting permit, or a new US \$1000 conservation fee charged to hunters, be disbursed directly to the protected areas nearest the given hunting concession, so that these funds can be used to improve wildlife protection and research efforts at these units, including by providing rangers with adequate equipment and food rations.

- **Enforce Existing Laws Concerning Protected Areas.** Laws concerning protected areas need to be enforced. Today, most of Kyrgyzstan's protected areas are protected in name only. Protected area regulations are routinely violated by entities as diverse as destitute individuals, organized poaching rings, and mining companies. Many protected area units are simply treated as public commons, with all plant and wildlife resources free for the taking. If there is to be any hope of preserving the Kyrgyz Republic's natural heritage, with the nation's threatened plant and animal species continuing to exist in their natural settings, it is imperative that effective law enforcement measures be taken to implement the regulations that have been created to protect both individual species and ecosystems.
- **Increase Transparency of Government Decisions Affecting Protected Areas.** Transparency of government decision making that either directly or indirectly affects protected areas must be increased. At present, it appears that many decisions are made in Kyrgyzstan that severely compromise the goals for which protected areas are created, but which do not take into consideration the viewpoints of protected areas managers, local conservationists, and the general public. Examples of such actions, or actions in progress, include the de-protection of Lake Chatyr-Kul to create an artificial fishery (see Part IV, Section A, pg. 85 above); the construction of a large, Chinese-owned, tourist complex in the midst of two sections of the Lake Issyk-Kul Nature Reserve (see Part III, Section A, pg. 43 above); selling of commercial hunting concessions on the boundaries of and inside the Sarychat-Ertash Nature Reserve; and mineral exploration by at least one mining company inside the core zone of Sarychat-Ertash (see Part IV, Section A, pg. 76 above). One extremely common, internationally accepted method that would increase the transparency of decision making concerning development projects in and around existing and proposed protected areas in Kyrgyzstan would be the implementation of an effective Environmental Impact Assessment (EIA) procedure requiring both public notification and public input before such projects commenced.
- **Prohibit Mineral Exploration and Extraction in Protected Areas.** Mineral resource extraction activities are clearly of vital importance to the Kyrgyz economy, however, the national government needs to develop a coherent policy and set of guiding regulations concerning mineral exploration and extraction activities in and around ecologically-sensitive protected areas. At present, decisions concerning these matters appear to be largely ad hoc, in violation of existing protected area regulations, and generally decided in favor of the mining

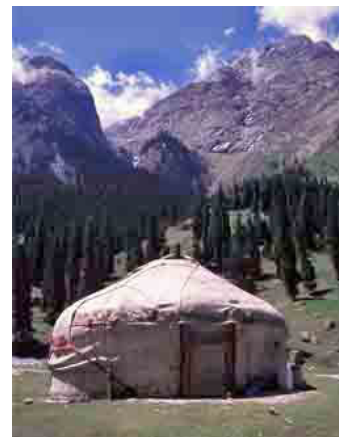
companies at the expense of protected areas. Many effective policies that are applicable to Kyrgyzstan can be found in the experiences of other countries in regulating mining and park issues (Farrington 2001, 2005).

- **Create an On-Line National Protected Area Database.** Create a national protected area database accessible by internet for use by park managers; local, provincial, and national governments; scientists; and potential visitors. At present, detailed information concerning protected areas in Kyrgyzstan is very hard to come by, and many decisions concerning the fate of protected areas are made without proper study as to the potential environmental impact of these decisions. Thus a protected area database and website would be one way to disseminate timely information to decision makers. A section of the database website could also be oriented towards prospective visitors who potentially play an important role in stimulating both local economies and local awareness concerning the importance of safeguarding an area's wild animals, plants, and scenic vistas. If such information is provided via the internet, tourists will likely follow.
- **Ratify the UN CITES Convention.** Finally, one of the strongest gestures that the government of the Kyrgyz Republic could make to show that trafficking in endangered species will not be tolerated in the nation would be to ratify and enforce the terms of the 1973 United Nation's Convention on International Trade in Endangered Species (CITES 1973).

B. Conclusions

The snow capped peaks, forests, and meadows of the Kyrgyzstan Tian Shan form a remarkable ecological bridge across the arid heart of Asia that connects the mountain ecosystems of Mongolia and Siberia with those of the Tibetan Plateau, Himalaya, and other areas of West and East Asia. For a small, temperate nation bounded by vast deserts and arid grasslands, Kyrgyzstan has remarkably high levels of species diversity, and the preservation of the nation's ecosystems are important for the ecological well-being of all of Inner Asia.

The Soviet system of protected areas and protected area management inherited by the Kyrgyz Republic has been slowly expanded and modernized since Kyrgyzstan gained independence in 1991. Unfortunately, due to the ongoing national economic crisis which began in the late 1980s, intensified during the 1990s, and which is not expected to improve dramatically anytime soon, protected areas in Kyrgyzstan are, for the most part,



Traditional Kyrgyz yurt,
Barskoon Canyon, Issyk-Kul
Province

protected in name only, and many units are used as public commons for grazing, woodcutting, hunting, and the collection of wild plants.

While protected areas are staffed by dedicated rangers, wages are now so low that rangers can no longer support themselves on their salaries alone, and must spend much of their time engaged in subsistence activities, such as herding livestock in protected area multi-use zones. As a consequence, time available for patrolling parks and reserves has been greatly reduced, and poaching of wildlife and illegal harvesting of plants and trees has proliferated in protected areas throughout the post-Soviet period. At present, many rare animal and plant species are threatened with extinction, and the nation's already extremely limited forest cover is being further reduced. Another major threat to the future integrity of the nation's ecosystems comes from the accelerated rate of retreat of glaciers in the Tian Shan, which are the source of much of the water for the former Soviet Central Asian republics and the extremely arid Chinese province of Xinjiang.

Although the economic hardships of independence have had a deleterious effect on the state of conservation in the Kyrgyz Republic, the post-Soviet economic collapse has also provided new opportunities for establishment of protected areas in Kyrgyzstan, primarily through the large-scale de-population of the nation's remotest grazing lands, and by opening the nation's borders to adventurous foreign visitors, who may someday be the basis of a significant tourist economy that will help support and promote Kyrgyzstan's protected areas.

However, with the opening of the Kyrgyz Republic's borders have come other economic pressures on both existing and potential conservation lands in the form of expanded mineral exploration and extraction activities; proposals for creation of international highways, railroads, and pipelines; as well as increased international trafficking in endangered species. It remains to be seen whether conservationists in Kyrgyzstan will succeed in their efforts to preserve the nation's fragile ecosystems in the face of these new economic pressures. At the present time, it appears that the deterioration of Kyrgyzstan's national conservation program is unlikely to be reversed without substantial support from the international conservation community.



Kyrgyz herding family, Naryn Province.

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References

Abdurahimova, F., R. Daviesson, and G. Fet 2001. Biodiversity assessment for Tajikistan. BIOFOR Chemonics International Consortium Task Order 803: Country Biodiversity Assessments in Central Asia. USAID Contract Number: LAG-I-803-99-00014-00. Chemonics International Inc. Washington D.C. 43 pp.
<http://www.biofor.com/reports.htm>. Accessed 19 May 2005.

[ADB] Asian Development Bank 2002. Technical assistance for regional cooperation in transport projects in Central Asia. TAR: CON 35077. March 2002. Asian Development Bank. Manila. www.adb.org/Documents/TARs/REG/r72_02.pdf. Accessed 31 May 2005.

Agakhanyantz, O. 1978. Main characteristics of the ecosystems of the Pamirs, USSR. *Arctic and Alpine Research* 10(2):397-407.

Aizen, V. and E. Aizen, 1997a. Climatic and hydrologic changes in the Tien Shan, Central Asia. *Journal of Climate*. 10(6):1393-1404.

Aizen, V., E. Aizen, J. Dozier, J. Melack, D. Sexton, V. Nesterov, 1997b. Glacial regime of the highest Tien Shan mountain Pobeda-Khan Tengry massif. *Journal of Glaciology*. 43(145):503-512

Akimaliev, T., J. Kyrbashev, U. Naamatbekov, and N. Nurdinov 2004. Chronicle of Nature: Naryn State Nature Reserve, Book 1. State Forest Service of the Kyrgyz Republic. Naryn. 37 pp. Russian language.

Babakulov, U. 2002. Hungry soldiers break hunting law. *Reporting Central Asia* No. 163. 22 November 2002. Institute for War and Peace Reporting. London.
http://www.iwpr.net/index.pl?archive/rca/rca_200211_163_1_eng.txt
Accessed 26 April 2005.

Bairamukova, I. 2004. Montana to help create tourist complex in Kyrgyz Ala-Archa National Park. *Times of Central Asia*, 2004a. 13 May 2004. 6(19/270):18. Bishkek.

[BK] Birding in Kazakhstan 2005. Aksu-Zhabagly Nature Reserve.
<http://birding.topcities.com/south/Aksu-Jabagly-nature-reserve.htm>.
Accessed 10 June 2005

[BLI] BirdLife International 2003. Data: China (mainland). BirdLife's online World Bird Database: the site for bird conservation. Version 2.0. Cambridge, U.K.
<http://www.birdlife.net/datazone/sites/index.html>. Accessed 13 June 2005.

Blua, Antoine, 2003. Central Asia: Melting glaciers could affect millions in region. Radio Free Europe/Radio Liberty. Prague. September 11, 2003.
<http://www.rferl.org/features/2003/09/11092003180201.asp>
Accessed April 14, 2005.

Bullen, M., D. Burbank, and J. Garver 2003. Building the Northern Tien Shan: integrated thermal, structural, and topographic constraints. *Journal of Geology*. 111(2):149-165.

[CAT] Cat Action Treasury 2005. Asiatic cheetah status surveys. Cape Neddick, Maine.
http://www.felidae.org/PROJECTS/Asiatic_Cheetah/asiatic_cheetah.htm
Accessed May 31, 2005.

[CATWTSBP] Central Asia Transboundary West Tien-Shan Biodiversity Project 2005. Global Environment Facility (GEF). Bishkek.
<http://www.catbiodiversity.net/eng/>. Accessed 1 June 2005

[CBD] UN Convention on Biological Diversity 1992. United Nations. New York.
<http://www.biodiv.org/convention/articles.asp>. Accessed 31 May 2005.

[CCO] ChinaCulture.org 2003. About China > Fauna & Flora > Nature Reserves: Bogeda Peak National Nature Reserve. Ministry of Culture and China Daily. Beijing.
http://www.chinaculture.org/gb/en_aboutchina/2003-09/24/content_21329.htm.
Accessed 14 June 2005.

[CITES] UN Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973. United Nations. New York.
<http://www.cites.org/eng/disc/text.shtml>. Accessed 31 May 2005.

Daviesson, R., G. Fet 2001a. Biodiversity assessment for Kyrgyzstan. BIOFOR, Chemonics International Consortium Task Order 803: Country Biodiversity Assessments in Central Asia. USAID Contract Number: LAG-I-803-99-00014-00. Chemonics International Inc. Washington D.C. 67 pp. <http://www.biofor.com/reports.htm>. Accessed 19 May 2005.

Daviesson, R., G. Fet 2001b. Biodiversity assessment for Kazakhstan. BIOFOR, Chemonics International Consortium Task Order 803: Country Biodiversity Assessments in Central Asia. USAID Contract Number: LAG-I-803-99-00014-00. Chemonics International Inc. Washington D.C. 76 pp. <http://www.biofor.com/reports.htm>. Accessed 19 May 2005.

Daviesson, R., G. Fet 2001c. Biodiversity assessment for Turkmenistan. BIOFOR, Chemonics International Consortium Task Order 803: Country Biodiversity Assessments in Central Asia. USAID Contract Number: LAG-I-803-99-00014-00. Chemonics International Inc. Washington D.C. 60 pp. <http://www.biofor.com/reports.htm>. Accessed 19 May 2005.

References

- Daviesson, R., G. Fet 2001d. Biodiversity assessment for Uzbekistan. BIOFOR, Chemonics International Consortium Task Order 803: Country Biodiversity Assessments in Central Asia. USAID Contract Number: LAG-I-803-99-00014-00. Chemonics International Inc. Washington D.C. 77 pp. <http://www.biofor.com/reports.htm>. Accessed 19 May 2005.
- Dompke, S. and D. Musina, editors. 2004. The call of our ancestors: natural sacred sites in the Issyk-Kul Biosphere territory. German Society for Technical Cooperation (GTZ). Bishkek. 84 pp.
- [ENRIN] Environmental and Natural Resource Information Network 1996. Biodiversity in Central and Eastern Europe: Research and monitoring (in Uzbekistan's protected areas). GRID-Arendal, United Nations Environment Program. Arendal, Norway. <http://enrin.grida.no/biodiv/biodiv/national/uzbek/RESEARCH.HTM>. Accessed 10 June 2005
- Farrington, J. 2001. A report on conflict between mining and special protected areas in Mongolia with models for conflict resolution from the United States, Canada, and Australia. Mineral Resources Authority of Mongolia. Ulaanbaatar. 112 pp.
- Farrington, J. 2005. The impact of mining activities on Mongolia's protected areas: a status report with policy recommendations. Integrated Environmental Assessment and Management. 1(3):283-289. http://www.allenpress.com/pdf/ieam-01-03-07_283-289.pdf. Accessed 29 June 2005.
- Fedosenko, A.K., P.I. Weinberg and R. Valdez, 1995. Argali sheep survey in the headwaters of the Korunduk River, Kirghizstan. *Mammalia* 59(3):452-455.
- Finch C. 1996. Mongolia's Wild Heritage: Biological Diversity, Protected Areas, and Conservation in the Land of Chingis Khan. United Nations Development Program - Mongolia. Ulaanbaatar. 40 pp.
- Fisher, R., K. Schmidt, B. Steenhof, N. Akenshaev 2004. Poverty and forestry: a case study of Kyrgyzstan with reference to other countries in West and Central Asia. Livelihood Support Program Working Paper 13. Access to Natural Resources Sub-program. UN Food and Agricultural Organization. Rome. 60pp. <ftp://ftp.fao.org/docrep/fao/007/j2603e/j2603e00.pdf>. Accessed 21 April 2005.
- Fitzherbert, A. 2000. Country pasture/forage resource profiles: Kyrgyzstan. Crop and Grassland Service, Plant Production and Protection Division, United Nations Food and Agricultural Organization. Rome. <http://www.fao.org/ag/AGP/AGPC/doc/Counprof/kyrgi.htm>. Accessed 19 May 2005.

Frost, D. 2004. Data. Amphibian Species of the World: an Online Reference. Version 3.0 (22 August, 2004). American Museum of Natural History, New York, USA.
<http://research.amnh.org/herpetology/amphibia/index.php>. Accessed 4 May 2005.

Government of China, 2005. Balikun Lake. China Economic Information: Xinjiang.
<http://www.xj.cei.gov.cn/xjzye/fhmbllkh.htm>. Accessed 14 June 2005

Grousset, R. 1939. The Empire of the Steppes: A History of Central Asia. Rutgers University Press. New Brunswick. 687 pp.

[GTZ] German Society for Technical Cooperation (GTZ)/Kyrgyz Republic Ministry of Environmental Protection, 1999. Environmentally sound land use in the Issyk-Kul Biosphere territory. Bishkek. 225 pp.

[GTZ] German Society for Technical Cooperation (GTZ) 2002. Kyrgyzstan: Issyk-Kul Biosphere Reserve. Brochure. Bishkek 4 pp.

Hazell, C.J. 2001. The status of wolf populations in post-Soviet Kyrgyzstan. *Endangered Species Update*, 18(4):142-146.

Hazell C.J. 2003. The spread of the Asiatic golden jackal (*Canis aureus*) in Issyk-Kul: symptom of a changing ecosystem. *Proceedings of the Issyk-Kul Symposium*, 24-25 October 2003, Cholpon-Ata, Kyrgyz Republic. German Society for Technical Cooperation (GTZ). Bishkek. 76 pp.

[HDGC] Head Department of Geodesy and Cartography of the Soviet Union, 1990. Across the Talas Range to Lake Sary-Chelek. 1:200,000 scale trekking map. Moscow.

Heinen, J., E. Shukurov, and C. Sadykova 2001. Legislative and policy initiatives in biodiversity conservation in Kyrgyzstan. *Post-Soviet Geography and Economics*, 42(7):519-543.

Hu, Z. and D. Zhang 2001. Country pasture/forage resource profiles: China. Crop and Grassland Service, Plant Production and Protection Division, United Nations Food and Agricultural Organization. Rome.
<http://www.fao.org/ag/AGP/AGPC/doc/Counprof/china/china1.htm>
Accessed 14 June 2005.

[ISLT] International Snow Leopard Trust 2003. Queen of the Celestial Mountains. Community and Business Forum. Bishkek. 18 pp.

Jumagulov, S. 2004. Chinese whispers in Kyrgyzstan. *Reporting Central Asia*, No. 309. 20 August 2004. Institute for War and Peace Reporting. London.
http://www.iwpr.net/index.pl?archive/rca2/rca2_309_4_eng.txt
Accessed 26 April 2005

References

- Kendirbaeva, A., U. Kerimbaev, and A. Kazakbaev 2003a. Arid plant communities of the Issyk-Kul Biosphere Reserve. Proceedings of the Issyk-Kul Symposium, 3-5 October 2002, Cholpon-Ata Kyrgyz Republic. German Society for Technical Cooperation (GTZ). Bishkek. 113 pp. Russian language.
- Kendirbaeva, A. 2003b. Humid plant communities of the Issyk-Kul Biosphere Reserve. Proceedings of the Issyk-Kul Symposium, 3-5 October 2002, Cholpon-Ata Kyrgyz Republic. German Society for Technical Cooperation (GTZ). Bishkek. 113 pp. Russian language.
- Khurshut, E. 2003. Red Listing in Central Asia: Protected Areas of Uzbekistan. Internet Access and Training Program (IATP), International Research & Exchanges Board (IREX), Bureau of Educational & Cultural Affairs (ECA), US Department of State. http://redlist.freenet.uz/reserves/uzmap_e.html. Accessed 10 June 2005.
- Kirby, A. 2003a. Kazakhstan's glaciers 'melting fast'. BBC News Online. London. 4 September, 2003. <http://news.bbc.co.uk/2/hi/science/nature/3077422.stm> Accessed: April 14, 2005
- Kirby A. 2003b. Snow leopards seized from circus. BBC News Online London. 28 February 2003. <http://news.bbc.co.uk/2/hi/science/nature/2807703.stm>. Accessed 31 May 2005.
- Knapp, J. 1996. How earth created heaven. *Nature*. 384(5 December 1996):409.
- Konurbaev, A., S. Timirkhanov 2003. Looking at Fishes in Kyrgyzia. Daru Ltd. - Advisers for Eastern Europe and Asia. Bishkek. 120 pp. English and Russian language.
- Koshkarev, E. 1988. Pattern of snow leopard migration in the Tien Shan. *Bulletin of the Moscow Society for Examination of Nature*. 93(4):22-30. Russian language.
- Kubicek, P. 1998. Authoritarianism in Central Asia: curse of cure? *Third World Quarterly*. 19(1):29-43.
- Kuratov, S. 2003. On the question of the creation of funds for specially protected natural territories in the Republic of Kazakhstan. *Ecological Society Green Salvation*. Almaty. http://www.conservationfinance.org/Documents/Vilm_papers/Presentations/Onpercent20thepercent20Question.pdf. Accessed 8 June 2005
- Mambetaliev, U. and E. Shukurov 2003a. Besh-Aral State Reserve: Management Plan 2001-2004. Central Asia Transboundary West Tien-Shan Biodiversity Project. State Forestry Service of the Kyrgyz Republic. Bishkek. 151 pp.
- Mambetaliev, U. and E. Shukurov 2003b. Sary-Chelek State Biosphere Reserve: Management Plan 2001-2004. Central Asia Transboundary West Tien-Shan Biodiversity Project. State Forestry Service of the Kyrgyz Republic. Bishkek. 181 pp.

[MEP] Ministry of Environmental Protection 1998. Kyrgyz Republic Biodiversity Strategy and Action Plan. MEP. Bishkek. 128 pp. English and Russian language. http://www.undp.org/bpsp/nbsap_links/nbsap_links.htm. Accessed 19 May 2005.

[NEPA] National Environmental Protection Agency 1994. China: Biodiversity conservation action plan - Annex 1: Priority ecosystems in China. Beijing. http://www.bpsp-neca.brim.ac.cn/books/actpln_cn/index.html. Accessed 13 June 2004.

Nichiporova, N and J. Kuzminykh 2003. Black Monday. Vecherny Bishkek. 23 July 2003. <http://www.vb.kg/eng/2003/07/23/panorama/1.html>. Accessed 2 June 2005.

Nifadiev, V.I., V.Ya.Ogurtsov, G.A.Desyatkov, V.M.Lelevkin, K.J.Bokonbaev, and S.A.Iliasov 1999. State of the environment of Kyrgyzstan. Scientific-Information Center "Aral", Kyrgyz-Russian Slavic University/Ministry of Environment Protection of the Kyrgyz Republic. <http://enrin.grida.no/htmls/kyrgyz/soe>. Accessed April 14, 2005.

Otorbaev, Kubat 2002. Bishkek officials caught smuggling rare animals. Reporting Central Asia, No. 122. 31 May 2002. Institute for War and Peace Reporting. London. http://www.iwpr.net/index.pl?archive/rca/rca_200205_122_5_eng.txt. Accessed 26 May 2005.

Otorbaev, K. 2003. Kyrgyzstan: Kulov out of solitary. Reporting Central Asia, No. 199. 16 April 2003. Institute for War and Peace Reporting. London. http://www.iwpr.net/index.pl?archive/rca/rca_200303_199_2_eng.txt. Accessed 26 May 2005.

People's Daily, 2001. Xinjiang to build nine main tourism areas. Life section. Tuesday, July 03, 2001. http://english.people.com.cn/200107/03/eng20010703_74074.html. Accessed 14 June 2005.

Perekhod, Y. and A. Poltoratskikh 2004. Brochure about Ile-Alatau National Park. Ecological Society Green Salvation. Almaty. http://www.greensalvation.org/English/Publish_eng/Herald_2003-2004/2004_14.htm. Accessed 9 May 2005.

Ramsar 2001. Wise use workshop announced for China, June 2001. What's New @ Ramsar. Gland, Switzerland. http://ramsar.org/wn/w.n.china_mtg_2001.htm. Accessed 14 June 2005.

Ramsar 2005. The Ramsar Convention on Wetlands. The World Conservation Union (IUCN). Gland, Switzerland. www.ramsar.org. Accessed 1 June 2005.

Rowland, R. 2002. National and regional trends in Kyrgyzstan, 1989-1999: Results from the recent census of Kyrgyzstan and 2001 update. Eurasian Geography and Economics. 43(7):529-581.

References

- Saidazimova, G. 2005. For Kyrgyz president, parliamentary elections are a family affair. *Central Asia Report*, 5(3). 25 January 2005. Radio Free Europe-Radio Liberty. Prague. <http://www.rferl.org/reports/centralasia/2005/01/3-250105.asp>. Accessed 1 June 2005.
- Sarygulov, D. 2003. Tengrianity and global problems of modernity. Proceedings of the first international scientific conference "Tengrianity is the world view of the Altaic people". November 10-13, 2003. Tengir Ordo Foundation. Bishkek.
- Savvaitova, K. and T. Petr 1999. "Fish and fisheries in Lake Issyk-Kul (Tien Shan), river Chu, and Pamir lakes" in *Fish and fisheries at higher altitudes*. UN Food and Agricultural Organization Technical Paper 385. pp. 168-186. UN FAO. Rome.
- Schaller, G. 1998. *Wildlife of the Tibetan Steppe*. University of Chicago Press. Chicago. 374 pp.
- [SFSKR] State Forest Service of the Kyrgyz Republic/TACIS 2003. *Special Protected Natural Territories of the Kyrgyz Republic*. Map and brochure. State Forest Service of the Kyrgyz Republic. Bishkek. English and Russian languages.
- Soucek, S. 2000. *A History of Inner Asia*. Cambridge University Press. Cambridge. 369 pp.
- Tabyshalieva, A. 2001. *Kyrgyzstan: common country assessment*. United Nations System. Bishkek. 135 pp. <http://www.undp.kg/english/publications.phtml?3>. Accessed 19 May 2005.
- Tazi, M. 1995. *Conservation and sustainable utilization of plant genetic resources in West Asia: sub-regional synthesis report*. Annex 2 of the report of the sub-regional preparatory meeting for West and Central Asia, Tehran, Islamic Republic of Iran, 9-12 October 1995. UN Food and Agricultural Organization. Rome. 13 pp. www.fao.org/ag/AGP/AGPS/Pgrfa/pdf/asiasw2.pdf. Accessed 21 April 2005.
- [TCA] *Times of Central Asia* (on-line), 2002. The golden hills. 23 May 2002. Bishkek. www.times.kg. Accessed May 2002.
- [TCA] *Times of Central Asia*, 2004a. Chinese company invests in Kyrgyz tourism. 13 May 2004. 6(19/270):2. Bishkek.
- [TCA] *Times of Central Asia*, 2004b. Chinese expansion causes concern. 6 May 2004. 6(18/269):11. Bishkek.
- [TCA] *Times of Central Asia*, 2004c. The Netherlands Embassy in Almaty supports awareness of nature in Kyrgyzstan. 9 September 2004. 6(36/237):17. Bishkek.
- Uetz, P. 2005. Data. *The European Molecular Biology Lab Reptile Database*. Heidelberg. <http://www.embl-heidelberg.de/~uetz/LivingReptiles.html> Accessed 4 May 2005.

Ulemann, K. 2003. Cultural-historical monuments of the Issyk-Kul Biosphere territory. German Society for Technical Cooperation. Bishkek. 88 pp. Russian language.

[UNEP] United Nations Environment Program - World Conservation Monitoring Center 1991a. Alma-Atinskiy Zapovednik (State Nature Reserve). World Database of Protected Areas: WCMC Site Sheets. Cambridge, U.K.
<http://www.unep-wcmc.org/sites/pa/0958v.htm>. Accessed 9 May 2005.

[UNEP] United Nations Environment Program - World Conservation Monitoring Center 1991b. Bayanbulak Nature Reserve. World Database of Protected Areas: WCMC Site Sheets. Cambridge, U.K.
<http://www.unep-wcmc.org/sites/pa/1845v.htm>. Accessed 14 June 2005.

[UNEP] United Nations Environment Program - World Conservation Monitoring Center 2005a. Data. World Database on Protected Areas. Cambridge, U.K.
<http://sea.unep-wcmc.org/wdbpa>. Accessed 9 June 2005.

[UNEP] United Nations Environment Program - World Conservation Monitoring Center 2005b. Aksu-Dzhabagly State Reserve. World Database on Protected Areas: WCMC Site Sheets. Cambridge, U.K. <http://www.unep-wcmc.org/sites/pa/1012v.htm>. Accessed 9 June 2005.

[UNEP] United Nations Environment Program - World Conservation Monitoring Center 2005c. Chatkal'skiy Zapovednik (State Nature Reserve). World Database on Protected Areas: WCMC Site Sheets. Cambridge, U.K.
<http://www.unep-wcmc.org/sites/pa/0966v.htm>. Accessed 9 June 2005.

[UNESCO] United Nations Educational, Scientific, and Cultural Organization 2002. UNESCO-MAB Biospheres Reserves directory - Biosphere Reserve Information: China, Bogeda.
<http://www2.unesco.org/mab/br/brdir/directory/biores.asp?code=CPR+07&mode=all>
Accessed 14 June 2005.

[UNESCO] United Nations Educational, Scientific, and Cultural Organization 2005a. Programme on Man and the Biosphere (MAB). Paris. <http://www.unesco.org/mab/>. Accessed 1 June 2005.

[UNESCO] United Nations Educational, Scientific, and Cultural Organization 2005b. UNESCO-MAB Biospheres Reserves directory - Biosphere Reserve Information: Kyrgyzstan, Sary-Chelek.
<http://www2.unesco.org/mab/br/brdir/directory/biores.asp?code=KIZ+01&mode=all>. Accessed 1 June 2005.

References

- [UNESCO] United Nations Educational, Scientific, and Cultural Organization 2005c. UNESCO-MAB Biospheres Reserves directory - Biosphere Reserve Information: Kyrgyzstan, Issyk-Kul.
<http://www2.unesco.org/mab/br/brdir/directory/biores.asp?code=KIZ+02&mode=all>. Accessed 1 June 2005.
- [UNESCO] United Nations Educational, Scientific, and Cultural Organization 2005d. UNESCO-MAB Biospheres Reserves directory - Biosphere Reserve Information: Uzbekistan, Mount Chatkal.
<http://www2.unesco.org/mab/br/brdir/directory/biores.asp?code=UZB+01&mode=all>. Accessed 10 June 2005.
- van der Ven, J. 2002. Looking at Birds in Kyrgyz Republic, Central Asia. Daru Ltd. - Advisers for Eastern Europe and Asia. Bishkek. 184 pp. English and Russian language.
- Vorobeev, G, and J. van der Ven 2003. Looking at Mammals in Kyrgyzia. Daru Ltd. - Advisers for Eastern Europe and Asia, Ltd. Bishkek. 247 pp. English and Russian language.
- [WI] Wetlands International 2005. A Directory of Wetlands of International Importance. Wageningen, the Netherlands.
http://www.wetlands.org/RDB/Ramsar_Dir/KyrgyzRepublic/KG001D02.htm. Accessed 1 June 2005.
- World Bank 1995. Kyrgyz Republic National Environmental Action Plan. Report No. 13990-KG. Infrastructure, Energy, and Environment Division, Country Department III, Europe and Central Asia Region. Washington D.C. pp. 176
http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000009265_3961029205653. Accessed 27 May 2005.
- Yunusova, I., A. Chingojoiev, and G. Buttoud 2000. "Case Study: the Kyrgyz forestry concept: policy changes for a multipurpose management of mountain forests in Central Asia" in Forests in Sustainable Mountain Development: A state of knowledge report for 2000. pp. 411-413. CABI Publishing. Wallingford, UK. 590 pp.
- Zhang, B., S. Mo, and H. Wu 2004. Digital spectra and analysis of altitudinal belts in Tianshan Mountains, China. Journal of Mountain Science 1(1):18-26.
http://www.imde.ac.cn/journal/Vol_01/2.pdf. Accessed 14 June 2005.
- Zlotin, R. 1997. "Geography and organization of high-mountain ecosystems in the former USSR" in Ecosystems of the World No. 3: Polar and Tundra. pp. 133-159. F. Wielgolaski, editor. Elsevier. Amsterdam.

Appendices

Appendix A:

Semi-Nomadic Livestock Herding Practices of Eastern Kyrgyzstan: A Brief Historical Overview with Recent Case Studies.

*****DRAFT PAPER*****

Semi-Nomadic Livestock Herding Practices of Eastern Kyrgyzstan: A Brief Historical Overview with Recent Case Studies.

*****DRAFT PAPER*****

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Abstract

This paper will present a brief overview of pre-collective and collective era herding practices of Kyrgyzstan's semi-nomadic pastoralists, followed by a discussion of the post-collective situation as illustrated by field visits to herders in the highland areas of eastern Kyrgyzstan made in 2003-2004. Major changes in Kyrgyz transhumant practices resulted from the late 19th century arrival of Slavic settlers and the forced collectivization of herders under Stalin. The subsequent creation of permanent settlements and introduction of mechanization during the collective period led to the increased sedentarization of the pastoral population. Livestock production shifted from horses to fine wool sheep as wool production became the top priority of Kyrgyz herders under the Soviet system. Following the privatization of all livestock after independence in 1991, the burden of risk devolved onto individuals, rather than on networks such as a collectives or clan units, for the first time in the history of these pastoralists. The ongoing process of social reorganization which followed livestock privatization has resulted in a wide variety of coping strategies being employed by herders, including both short and long distance migration as partnerships, individual families, extended families, or in reorganized herding cooperatives, while reduced livestock numbers since independence have left vast areas of grazing lands vacant. In spite of the many dramatic changes of the last 150 years, migration patterns and cultural identity among Kyrgyz herders have persisted.

Introduction

The Kyrgyz are a Turkic people who have their origins in Siberia's upper Yenisey River basin, in and around the present day Tuvan Republic. One of the earliest mentions of the Kyrgyz people in the historical records comes from a stone inscription found in the Orkhon River valley of central Mongolia, which describes the Kyrgyz as a 7th century enemy of the Kōk Turks (Grousset 1939). The Kyrgyz briefly ruled most of the territory of modern Mongolia from 840 to 925 AD, and were later swept up in the Mongol conquests of the 13th century, being pushed westward, eventually to settle permanently in the western Tian Shan in the 16th century (Soucek 2000).

Modern Kyrgyzstan is a nation which is 94 percent mountainous, with elevations ranging from 840 m in the capital Bishkek to over 7000 m in both the Tian Shan and Pamir-Alai Ranges, a fact which has had a great influence on the Kyrgyz system of semi-nomadic pastoralism (Schmidt 2001). A nation of horsemen, three events of the modern era were to dramatically affect the Kyrgyz people, and eventually change their semi-nomadic pastoral way of life forever. The first was the arrival of the Russian army in Pishpek, present day Bishkek, in 1860, soon to be followed by thousands of Russian and Ukrainian settlers. These European colonists appropriated large tracts of the most fertile lowland pastures, converting them to plough land, greatly reducing the amount of winter pasture available to the Kyrgyz, while also disrupting their seasonal migration patterns and water access for their livestock (Popova 1994, Wilson 1997). This event forced some small herd owners to begin leading settled lives, and by 1914 up to 22 percent of the Kyrgyz population had settled (Popova 1994).

The next major event to affect the Kyrgyz system of nomadic pastoralism was the forced collectivization under Stalin of all Kyrgyz pastoralists between about 1928 and 1932, after which time permanent settlements began being built throughout the whole of Kyrgyzstan. Use of the yurt (Kyrgyz: *boz ui*), which was now seen as being backwards, was greatly reduced, while mechanization was introduced for production and processing of agricultural products, and for transportation, greatly reducing the need for horses and camels for transport and haulage. The third event to dramatically affect Kyrgyzstan's semi-nomadic herders (Kyrgyz: *chaban*) was the collapse of the Soviet Union in 1991 and the resulting disbandment of the collectives. The subsequent economic crisis and ongoing process of "de-development" have left large numbers of semi-nomadic herders to exist as individuals, rather than part of a larger collective or clan unit, for the first time in their history.

This paper will give a brief overview of pre-collective and collective era herding practices of Kyrgyzstan's semi-nomadic pastoralists, followed by a discussion of the post-collective situation illustrated by field visits to herders in the highland areas of Kyrgyzstan's eastern Naryn and southern Issyk-Kul provinces conducted over a 10 month period in 2003-2004. In the organizational vacuum left in the wake of independence, most former herding collective members found themselves to be individual livestock owners, although a small number of herding collectives were simply reorganized as independent, member owned, cooperatives. In the course of field visits both individual herders and cooperatives were found to be using widely varying

operational strategies to cope with the new economic order. These included formation of herding or mixed herding and farming cooperatives, both short and long migration as individual family units, extended family units, or partnerships, and management of family owned herds or mixed herds of both family owned livestock and the small livestock holdings of sedentary Kyrgyz. While many former herders now have so few animals as to make migration to seasonal pastures uneconomical, semi-nomadic livestock herding remains the cultural foundation of the Kyrgyz identity, and many of the herders visited persist in seasonal migration patterns that have changed little since the coming of the Russians in the 19th century.

Pre-collective Era

In the late 19th century Kyrgyz herders followed a three-pasture annual nomadic cycle which was largely vertical in nature, as dictated by the up to seven parallel ranges separated by narrow valleys which comprise the Tian Shan in the Kyrgyz homeland. At this time horses were the animal most valued by Kyrgyz herders because of their ability to dig through deep mountain snows to get at grass, their mobility on long migrations, and their importance for transportation, meat, milk, defense, and raiding. While cows and sheep were also kept, these were considered to be of lesser importance until the arrival of the Russians, and the subsequent imposition of relative political stability on the Central Asian region (Emeljanenko 1994, Tynaliev 1994).

Winter camps (Kyrgyz: *kyshtoo*) were established at lower elevations in sites sheltered from the wind, such as the mouths of tributary canyons and ravines opening onto larger river valleys located at the base of mountain ranges. While horses could be kept in pastures with snow cover, sheep and cows were kept in areas with little snow, particularly on steep south-facing mountain slopes with good solar illumination, where snowfalls quickly melt away. If snow covered all areas, horses were driven ahead first to clear snow with their hooves, followed by sheep and cows. In summer the Kyrgyz drove their herds to summer pastures (Kyrgyz: *jailoo*) in the high mountains in both subalpine and alpine meadows for several months before descending again in autumn. Spring and autumn pastures were located at points intermediate between winter and summer pastures, often being one and the same, as pastures grazed in spring had largely recovered by autumn (Emeljanenko 1994, Tynaliev 1994).

Pastures rights and migrations routes were predetermined, being passed down from generation to generation within a clan, and migration distances varied from 20 to 200 km (Emeljanenko 1994). Families of a clan moved together, and at the beginning of the 19th century up to 100 Kyrgyz families might move together as protection against other raiding clans and tribes. However by the end of the 19th century, nomadic camps usually consisted of only 5 to 10 yurts, although occasionally camps were seen with up to 30 yurts (Emeljanenko 1994). Throughout the pre-collective period nomadic herders dwelled year round in their yurts, and there were few permanent structures outside the lowland bazaar towns (Tynaliev 1994).

The main seasonal activities of herding camps at this time were lambing and wool shearing at spring pastures between March and May, fattening of animals and processing of milk and wool at summer pastures from June to August, coupling of animals, sheep shearing, tool and yurt repair, sewing of winter clothes, and preparation of meat for winter were carried out at autumn pastures from September to November, while from December to February families returned to their winter pastures where livestock had to be continuously herded to appropriate terrain depending on snow conditions and animal type (Emeljanenko 1994).

Collective Era

At Stalin's order, collectivization of Kyrgyz and Kazakh herders took place over a four-year period from about 1928 to 1932. Semi-nomadic herders were forced to reside in permanent settlements and to handover their livestock to local authorities for redistribution. The results were disastrous, with many herders responding to the collectivization process by slaughtering their animals rather than surrendering their herds to state control. More animals were lost when, in order to meet Soviet wool production goals, sheep were sheared in winter rather than spring and died en masse from the severe cold. By 1932 only 1.3 million out of an original 18.5 million sheep remained in Soviet Central Asia, resulting in the famine of 1931 to 1933 where at least one million people died (Popova 1994, Soucek 2000). At this time thousands of Kyrgyz and Kazakhs fled to China, Mongolia, Afghanistan, Iran, and Turkey to escape hunger and oppression.

Nevertheless, Kyrgyz herders were eventually settled in permanent villages, and mechanization was introduced for transportation, farming, and processing of livestock products. Soviet planners placed a high priority on wool production in Kyrgyzstan, leading to the creation of a breeding program in which non-native fine-wool sheep were crossbred with indigenous breeds of fat-tail sheep (Fitzherbert 2000, C. Kerven 2005-personal communication). Although the quality of wool from the introduced crossbreeds of sheep was higher, they were not as well-suited to the harsh continental climate, and, unlike the hardy indigenous fat-tail sheep, were less able to search for grass under snow. Thus the new fine-wool crossbreeds required supplemental feed during the long winter months, such as sown fodder crops or hay, as well as winter sheds for warmth (Fitzherbert 2000, Van Leuwenn 1994, Humphrey 1999). The introduced breeds also did not take to long annual migrations, and were eventually transported to summer pastures primarily by truck (Schillhorn van Veen 1995, Wilson 1997). Thus the introduction of "improved" breeds of livestock, such as sheep and dairy cows, reinforced the process of sedentarization of Kyrgyz herders in permanent villages by requiring the construction of winter sheds and the large scale planting of fodder crops for winter feed. However, with the exception of horses, livestock populations had recovered to pre-revolution numbers by 1941 (Table A1).

Post-war organization of herding collectives consisted of two types of collectives, the state farm (Russian: *sovkhos*) and the collective farm (Russian: *kolkhoz*) of which there

Table A1. Kyrgyzstan Livestock Populations (thousands)

Year	Cattle	Sheep and Goats	Horses	Total	Sheep Equivalents
1916	519.0	2544.0	708.0	3771.0	8679.0
1941	554.9	2529.1	407.7	3491.7	7342.1
1968	912.0	9467.0	259.7	10,638.7	15,325.5
1986	1100	10,200	275	11,575	17,075
1987	1150	10,100	290	11,540	17,300
1988	1180	10,200	295	11,675	17,575
1989	1190.0	10,313.0	300	11,803	17,763
1990	1214.0	10,060.0	305	11,579	17,655
1991	1205.5	9968.1	312.7	11,486.3	17,559.1
1992	1122.4	8741.5	313.0	10,176.9	15,918.5
1993	1062.3	7322.3	322.0	8706.6	14,243.8
1994	920.1	5076.4	299.0	6295.5	11,171.9
1995	869.0	4274.8	308.1	5451.9	10,160.3
1996	847.6	3716.1	314.1	4877.8	9524.6
1997	884.8	3804.9	325.4	5015.1	9855.9
1998	910.6	3810.6	335.2	5056.4	10,039.6
1999	932.3	3806.5	349.8	5088.6	10,217.0

Sources: Tabyshalieva 2001, Tynaliyev 1994, Spoor 1995, Wilson 1997.

were about 275 state farms and 195 collective farms in Kyrgyzstan in 1991, with over half their output being livestock (Wilson 1997; Duncan 1994). In practice state farms and collective farms differed little in their operations and management, both being subject to government determined production targets and both marketing or bartering their produce through state channels. However, while state farms were property the state, collective farms formally belonged to their workers (Wilson 1997, Humphrey 1999). In Kyrgyzstan, these collectives were made up of anywhere from one to three neighboring villages which were usually composed of related family groups (Van Leeuwen 1994). Because clan based herding groups were settled together to form the core of newly constituted villages during the collectivization process, the ancient social relationships of Kyrgyz clans were for the most part retained, in spite of the turmoil of the period.

These permanent collective villages were constructed on the sites of winter pastures in low-lying valleys or in the mouths of tributary canyons and ravines, essentially forming sedentary winter camps. Winter sheds were built for livestock in the new villages and surrounding fields were turned over to the production of both hay and sown fodder crops, as well as potatoes and other food crops grown for consumption by collective members. Consequently, many collective workers now stayed in the village year round, farming fodder crops for the burgeoning numbers of fine wool sheep and performing other stationary duties. In addition to villages, isolated permanent houses with winter sheds were also built in sheltered mouths of neighboring canyons and ravines, forming a line of camps that stretched out on either side of villages in long mountain valleys.

For both state and collective farms, grazing lands were not fixed but allocated to the farms by local soviets (Tynaliyev 1994). Yet in spite of the dramatic changes in Kyrgyz society during the Soviet-era, patterns of migration remained remarkably similar to those which took place prior to collectivization. Winter camps, either in villages or isolated houses, began to be occupied for much longer periods, with herders now remaining in permanent housing six to nine months of the year. However, in summer livestock continued to be driven into high mountain pastures for several months each year, where yurts were set up to house herders. Intermediate pastures were sometimes occupied for short periods in the spring and fall (Wilson 1997).

One of the most dramatic changes in herding technique, however, was the widespread introduction of trucks in the post-war era to transport sheep and other animals to distant summer pastures, some more than 200 km from home villages, rather than herding animals on horseback (Wilson 1997). At the same time, in continuing efforts to increase wool production, sheep numbers were rapidly increased after the war (Table A1). In order to accommodate rapidly expanding herds, numerous new herding camps consisting of one or two permanent houses with winter sheds were built on snow free winter pastures in remote high mountain valleys, such as the Ak-Sai and Ak-Shirak Valleys. These new permanent camps were all associated with a home collective, often located at distances of more than 200 km from the camp.

The new permanent camps were inhabited all winter, after which short 5 to 20 km migrations were made to summer pastures where yurt camps were established. These isolated “satellite camps” were supported year round by monthly deliveries of food, coal for heating and cooking, and other supplies furnished by the parent collective, at which time live animals, meat, and wool were trucked out for processing at the collective’s home location. The new camps were typically occupied by one to three herders who might live largely by themselves for eight or nine months of the year, at times only being joined by their families during holidays and summer months. However, all remote camps were accessible by truck, leading to construction of improved roads in remote areas, and many even had electricity, either from power networks or generators provided by the collective.

In an effort to make life in these remote camps more bearable, in addition to monthly truck deliveries camps were also served year round by “cultcenters”, short for “cultural centers”, which were villages built by the government at central locations in remote mountain valleys that functioned specifically as service centers for herders living far from their home villages, rather than being collectives in and of themselves. Cultcenters included facilities like a medical clinic staffed by a nurse or doctor; a pharmacy; a shop selling food, clothes and other supplies; a school with dormitory for children of herders, which permitted more frequent parental visits; a library; and a club that served as a community center for dances, movies, and other gatherings.

With support facilities existing for herders year round in even the most remote valleys of Kyrgyzstan, Soviet planners continued to increase livestock numbers on Kyrgyzstan’s mountain pastures each year, regardless of the environmental consequences (Table A1).

At the time of independence, state farms specializing in livestock production typically possessed 16,000 sheep, 1400 head of cattle, and 2300 ha of arable land, while collective farms were slightly larger, typically having 22,000 sheep, 1800 head of cattle and 3000 ha of arable land. In both cases sheep numbers included a small percentage of goats, which were estimated to be 2.5 percent of the total (Wilson 1997). Horses for both typically numbered 400 to 500 head, which were used for work and transportation to remote areas (Tynaliev 1994). Each herder in the collective was responsible for managing 500 sheep or 50 to 70 cows or yaks, being assisted at times by his wife and school-aged children (Tynaliev 1994).

Total livestock numbers finally peaked in 1989 at 2.4 times 1941 levels with a total overall livestock population of 17.8 million sheep equivalents (1 sheep eq. = 5 cows or horses), while sheep numbers were 4.1 times the 1941 total at 10.8 million head (Table A1). With Kyrgyzstan having a total area of 198,500 km², this made for an overall stocking rate of 90 sheep eq./ km². By way of comparison, Mongolia with an area of 1,566,000 km² had 1990 animal populations of approximately 15 million sheep, 5 million goats, 3 million cows and 2.5 million horses, or 50 million sheep equivalents, and an overall stocking rate of 38 sheep eq./ km² (Humphrey 1999). By 1989 animal population levels were considered to be two to three times the stocking capacity of winter and spring/autumn pastures, which led to severe pasture degradation, including proliferation of invasive woody plant species, erosion, slope failure, and, in general, reduced overall productivity of pasture lands (Tynaliev 1994, Fitzherbert 2000). At this time more pastures were lost by being converted to plough lands used to sow additional fodder crops to feed swollen herds, feed requirements having increased four times between 1960 and 1987 (Wilson 1997). Whereas in the precollective period herd sizes were limited by availability of winter pasture, during the Soviet period herd sizes were limited by the availability of sown fodder crops for winter feed. By 1987 grain used for animal feed was twice that consumed by the human population of over 4 million people (Wilson 1997).

At the time of independence, Kyrgyzstan was the Soviet Union's third largest producer of meat and wool after much larger Russian and Kazakh Soviet Socialist Republics (Wilson 1997).

Post collective period and case studies.

On August 31, 1991, 10 days after the failure of the attempted hard-line coup to overthrow Gorbachev, and following declarations of independence by the Baltic Republics, the Caucasus Republics, the Ukraine, Belarus and Moldova, the government of the Kyrgyz Soviet Socialist Republic became the first of the Central Asian republics, to declare independence, albeit reluctantly. The poorest of the Soviet republics, independent Kyrgyzstan was left without state subsidies, industry, fossil fuel supplies, and markets for its goods (Duncan 1994). The new nation suddenly found itself extremely isolated as a landlocked nation with poor transportation infrastructure and either long distances, as in the case of China, or multiple international borders separating it from potential new markets in East Asia, South Asia and the Middle East.

Privatization of Kyrgyzstan's agricultural sector began in 1991 and one by one the republic's herding collectives were disbanded. Animals, equipment, machinery, buildings and other collective assets were distributed among collective members, who reluctantly found themselves to be individual livestock owners with no experience of herding without state support. To make matters worse, most socialist institutions in rural areas, such as livestock breeding, veterinary, and medical services, were quickly terminated, while remaining machinery and infrastructure rapidly deteriorated with out maintenance subsidies from Moscow. As throughout the former Soviet Union, self-sufficiency had now become imperative for survival in the post-Soviet Kyrgyzstan.

Economic crisis immediately ensued after independence, resulting in devastating hardship for the population. While in 1988 12 percent of the Kyrgyz population were considered to be living below poverty level, by one count this level had soared to 88 percent by 1995 (Babu 2000). Nutrition suffered as the calorie intake of 59 percent of the population fell below the recommended 2200 calories per adult per day, and a large increase in malnutrition was seen among children in Kyrgyzstan (Babu 2000). Strategies adopted to cope with economic hardship included borrowing of food, a practice used by 84 percent of Kyrgyz pastoralists in one study, reduced consumption of certain foods such as meat, milk and sugar, and selling off of family assets such as livestock, agricultural machinery, and even household items such as carpets and television sets (Howell 1996).

The new economic reality created by rapid conversion from state planning to a free market system was quickly reflected by livestock numbers in Kyrgyzstan. Sheep numbers plummeted from a high of 10.3 million in 1989 to just 3.7 million in 1996, at which level numbers stabilized, as the now privately owned animals distributed to former collective members were slaughtered for meat or bartered away for foodstuffs, clothing, fuel, and other necessities (Table A1). The number of cattle dipped by about 30 percent from a high of 1.2 million head in 1990 to 848,000 in 1996. Significantly however, over the 10-year period from 1989 to 1999, the number of horses in Kyrgyzstan actually increased from 300,000 in 1989 to 350,000 in 1999, an indication of a return to old ways as herders became increasingly reliant on horses after vehicles and machinery quickly fell into disrepair in the absence of subsidized maintenance and a ready supply of spare parts (Tabyshalieva 2001).

The rapid decline in livestock numbers was accompanied by two other significant trends with respect to livestock production. The first was a decline in the number of fields sown with fodder crops due to reduced demand as livestock numbers fell, which were given over to wheat production as the demand for domestic wheat simultaneously increased. Self-sufficiency in grain became a national priority as old Soviet-era inter-republic trade relations faltered, and wheat production in Kyrgyzstan doubled in a short period from 634,400 tons produced in 1992 to 1,273,700 tons in 1997 (Spoor 1995; GTZ 1999; Babu 2000; Tabyshalieva 2001; Suleimenov 2000).

Accompanying the decrease in fodder production was a simultaneous shift in type of sheep raised from the introduced fine-wool crossbreeds back to the indigenous fat-tail sheep, which are favored by Kyrgyz for their meat (Schmidt 2001, GTZ 1999). There are two primary reasons for this shift. First, in the early 1990's demand for wool on the international market fell sharply, depressing prices. Secondly, with the 64 percent decrease in sheep numbers between 1989 and 1996, the price of mutton, a staple of the Kyrgyz diet, rose to above international market rate (Table A1, Schmidt 2001). Less dependent on fodder crops, winter sheds, and truck transport for migration, and with a higher market value, local fat-tail sheep quickly became a better economic option for independent herders in Kyrgyzstan. While the wool of the indigenous breeds is coarser and darker than that of fine wool sheep, reducing its value for clothing manufacture, it nevertheless remains well suited for making felt products such as yurts and shyrdaks, the traditional felt carpet of the Kyrgyz. Consequently, as a result of these economic developments, wool production in Kyrgyzstan fell by 66 percent from 33,700 tons in 1992 to 11,400 tons in 1997 (UNS 2003). Yet even as late as 1994 Kyrgyz wool still accounted for 10 percent of total wool production in the former Soviet Union and one percent of total world production (Wilson 1997). However, with the international rise in wool prices that began in 2000, this trend has begun to reverse and large-scale sheep herders are now returning to raising fine-wool sheep as the demand for wool increases (FAO 2005, FAOSTAT 2005, C. Kerven 2005 – Personal Communication).

Another major hierarchical change directly affecting herders in post-Soviet Kyrgyzstan is that of land distribution. Whereas in the Soviet-era all land was the property of the state, and pastures were allocated by local soviets, it is now possible to purchase limited amounts of arable farmland and residential land in Kyrgyzstan. Ownership of Kyrgyzstan's vast pasturelands, however, has been retained by the state. Rights to use pastures are presently available to both individual herders and other economic entities in the form of five to ten year pasture leases granted by national, provincial, and district governments, depending on the type and location of pastures leased. However, these leases are not issued on the basis of historical use of lands, but rather on the basis of competitive bids that evaluate not only the price bid per hectare but also a business plan submitted by the bidder (Chemonics 2003).

In order to see first hand how herders practicing transhumance in post-socialist Kyrgyzstan were adapting to the new economic order, the author made a series of field visits to pastoralists living in Issyk-Kul and Naryn Provinces (Russian: *oblast*) of eastern Kyrgyzstan between December of 2003 and October of 2004. Naryn Province and the high mountain valleys of southern Issyk-Kul Province were chosen as study sites because most observers consider this region to exhibit Kyrgyz herding culture in its "purest form". These regions are dominated by mountainous pasturelands where livestock herding is the primary economic activity. Although ethnic Kyrgyz only comprised 64.9 percent of the total population of Kyrgyzstan in 1999, the population of the study area was almost exclusively Kyrgyz (Rowland 2002).

Survey methodology used consisted of a mix of fairly informal interviews, conversations, and field trips with various herders and managers at each site visited, and was by no

means a definitive scientific survey. Nevertheless good geographic coverage of the eastern Kyrgyzstan highlands was achieved, and various distinct patterns of present day transhumant practices emerged, as detailed below. Over the course of these excursions, it was seen that transhumance continued to be practiced by a large segment of the population in the study region, and that in the 13 years since independence, semi-nomadic herders had adopted a variety of coping strategies in response to the end of generous state support for herders.



Map A1. Location of Case Study Sites in Eastern Kyrgyzstan.

I. Issyk-Kul Province

Issyk-Kul Province is Kyrgyzstan's eastern-most province, and site of the nation's highest peak, the 7489 m Peak Pobeda, as well as the world's second largest mountain lake, the 170 km long, glacier fed Lake Issyk-Kul. The lake lies at the center of the province's economic life, which is based on wheat and fodder crop farming on the fertile alluvial lands immediately surrounding the lake, summer tourism, and mining, including the Canadian operated Kumtor Gold Mine, which by itself accounts for 10 percent of Kyrgyz GDP each year (TCA 2002). Ethnic Kyrgyz make up 79.5 percent of the total population of the province (Rowland 2002).

However, in spite of the province's relatively diversified economy, 86.4 percent of agricultural land (1,413,700 ha), or 33 percent of the province's total area, is classified as pastureland, and livestock herding continues to be a very important part of the province's economic activity, particularly in the Kyrgyz dominated region south of the lake (UNS 2003). In Issyk-Kul province, the author visited nine herding areas, the Arashan, Jeti-Oguz, Karakol, and Chong-Jargylchak Valleys on the northern slopes of the Terskey Range along the south shore of the lake, the Ak-Shirak, Ertash, and Sary-Jaz Valleys in the high (typically >3000 m), Tibet-like plateau valleys, known locally as "syrtlands", located near the Chinese border, the Zaria and Aikol Cooperatives based in villages near the south shore of the lake in the lowland towns of Ak-Suu and Bokonbaeva respectively, and also the village of Keng-Suu, at the base of the Kungoy range northeast of the lake.

1. Karakol/Arashan/Jeti-Oguz Valleys

The Karakol Valley is located on the outskirts of the Issyk-Kul provincial capital of the same name. Like the neighboring Arashan Valley to the east and the Jeti-Oguz Valley immediately to the west, the valley begins at an elevation of about 1800 m on the gently sloping alluvial lands surrounding Lake Issyk-Kul. These valleys then rise steeply through forests and meadows to tree line at about 3000 m, before finally terminating at about 3400 m at the foot of glaciers descending the north slope of the 5200 m high Terskey Range. The total length of each valley is about 25 to 30 km. The lowest reaches the valleys are deep, narrow, V-shaped river valleys, while the upper reaches of all three are broad glacial valleys with multiple, flat glacial steps covered in montane and alpine meadows.

The Karakol Valley is typical of all three valleys. Throughout most of the Soviet period, the Karakol Valley was occupied by both the Karakol Forestry Collective (Russian: *leskhoz*) and the Arashan State Farm, at which time about 5000 sheep were grazed in the valley as well as hundreds of cows and horses. Today, while nominally a national park, the Karakol Valley is still host to an active logging operation and is occupied from mid-April to mid-October by 20 herders with about 2000 head of livestock, primarily sheep, but including numerous horses and cows.

Animals are driven from the villages near the valley's mouth to summer pastures throughout the valley, with migration distances ranging anywhere from 10 to 40 km. At the time of the author's visit in mid-June of 2004, there were four active summer herding camps in the Karakol Valley, strewn along a middle 15 km reach of the valley. The largest camp consisted of two Russian-style cabin tents housing seven male herders ranging in age from late teens to late 30s. Pastures were leased from the Karakol National Park administration, essentially the reorganized forestry collective, which still manages the logging and tree nursery operations in the park. This particular group of herders looked after approximately 600 sheep, 400 cows, and 100 horses. About half of these animals were their personal holdings, while the remaining half were owned by people from nearby villages who paid a fee of 200 som per month to have their animals watched (in 2004, US \$1.00 = ~42 Kyrgyz som).

Thirty-five horses were observed at the very top of the valley, grazing on the outwash plain at the foot of a large glacier, while smaller numbers of horses were found in high tributary valleys above the upper half of the main valley. Cows, primarily bulls and bull calves being raised for meat, were found in the lower parts of the same tributary valleys and meadows in the middle section of the main valley, while milking cows beyond the herders' immediate daily needs were generally left behind in villages where sedentary owners could milk them daily. About every three days throughout the summer, herders riding in groups of two or three checked on horses and cows in the remote upper valley and adjacent tributary valleys, all of which ended in glaciers, snowfields, or steep rocky passes, effectively preventing livestock from straying into neighboring valleys. Each morning sheep were herded from the herders' tent camp to nearby pastures, which are rotated over the course of the summer, and herded back to camp nightly, although no sheep pens were erected in the valley.

Interestingly, traditional Kyrgyz yurts were only seen in use by herders in the very lower Karakol and Jeti-Oguz Valleys, while in the upper sections of all three valleys only Russian-style canvas cabin tents were used. When asked why, the response was that trucks or jeeps were needed to transport the bulky yurt frames and felt coverings up-valley. The narrow jeep tracks up each of the steep-sided valleys are typically closed by avalanches until mid-June, although passable on horseback by mid April. Consequently it was easier for herders to take canvas cabin tents up-valley on horseback in pieces. Once at the summer camp, young spruce trees were cut for tent frames which were abandoned in autumn. In past times, the yurt may have been transported by camel, but in general there are few remaining camels in the immediate vicinity of Lake Issyk-Kul, though still found in small numbers elsewhere in Kyrgyzstan. Nevertheless, the cabin tents did have the usual yurt amenities, including an indoor wood stove, large pot for boiling meat and steaming dumplings, a samovar with detachable stove pipe, low table, shyrdaks, milk cans, and also a sleeping and eating platform at the back of the tent.

In winter animals were driven down-valley and pastured in the immediate vicinity of local villages, where snow cover was minimal due to the mild climate immediately around the lake, "Issyk-Kul" literally meaning "warm lake". In the villages, animals were fed supplemental fodder such as sain foin, barley, and hay at either individual family homes or in large winter sheds on the village outskirts.

Herding practices in the parallel Arashan and Jeti-Oguz Valleys were generally the same, as in the Karakol Valley. Woman and children were sometimes present at herding camps in these valleys, particularly young families who resided with their in-laws or other family members in winter. Other family members often remained in the village throughout the summer to look after homes, family garden plots, milk cows, elders and the like, with herders periodically making the half day ride down the mountain to visit and get supplies.

2. Chong-Jargalchak Valley

The Chong-Jargalchak Valley also lies on the north slope of the Terskey range, approximately 70 km southwest of Karakol. The valley is very similar in geography and land use to the three previously discussed valleys, possessing an extremely Alp-like landscape of mixed forest, meadows, and ice fields. The valley was formerly a summer pasture of the Ak-Terek State Farm, headquartered in the south shore town of the same name located five km to the east. Present day land uses include a unit of the Jeti-Oguz Forestry Collective, individual family herders residing in the valley in cabin tents in summer, and, nominally at least, the Chong-Jargalchak Wildlife Sanctuary (Russian: *zakaznik*).

In a smaller parallel valley, several kilometers to the west of the main valley but still within the Chong-Jargalchak Wildlife Sanctuary, an extended family from the village of Chong-Jargalchak had established their summer camp. The family was fairly large and included two grandfathers and their wives, five younger married couples, and eight grandchildren. The spot they had chosen for their camp was a well-watered meadow surrounded by spruce forest in the lower valley, only a short one to two hour, approximately 10 km horse ride to their home village of Chong-Jargalchak, located on a bluff overlooking Lake Issyk-Kul. The families were dwelling in a pair of cabin tents, although there were two Soviet-era poured concrete cabins in the meadow, formerly property of the herding collective. The day the author visited, the younger men in the family were in the process of removing the roofs from these structures, presumably to use the roof timbers and corrugated transite roofing panels for home improvements in the village. Together, the family owned 600 sheep, which were herded back to the camp daily. Although in nearly every respect living the traditional summer life of semi-nomadic herders, the family had chosen a summer pasture close to the village, that permitted family members to make frequent trips home to check on residences and business in the village, and also allowed men easy visitation of wives and children when they were staying in the village rather than at summer camp.

3. Keng-Suu

Keng-Suu was the only village visited in the northern part of the Lake Issyk-Kul basin. The village lies about 35 km east of the northeastern tip of the lake, at the foot of the Kungoy Range. The range rises 1400 m behind the village, to an elevation of about 3200 m, where the crest of the ridge forms the international boundary between Kazakhstan and Kyrgyzstan. Land use around the village includes the Keng-Suu Forestry Collective, grain farming, local village pastures, and nominally at least, the Keng-Suu Wildlife Sanctuary (*zakaznik*). With a 1993 population of 1520, Keng-Suu, along with neighboring villages, formed part of the Santash Collective Farm, which at its peak managed about 30,000 sheep (Karypkulov 1995). Each herder in the collective, with the help of his wife and children, was responsible for overseeing 600 to 700 sheep. Today economic activities in the village are dominated by logging and grain farming, and total numbers of livestock in the village have dwindled to about 1000 sheep, 1000 milk cows, and 200 horses.

One 26-year old herder in Keng-Suu was one of the last “large” herd owners in the village, owning about 75 sheep, 10 cows, and 10 horses, that were housed in two winter sheds next to his residence which he had inherited from the collective. In an effort to diversify the family’s largely subsistence production, the herder, with the help of his wife and young children, now also plants a half hectare of potatoes each year behind their animal sheds in addition to having an interest in a wheat plot shared with other families. A small plot of land behind the family’s home is rented out to Russian bee-keepers, who keep their hives there from September to May.

From about late September to late May, the family kept its animals pastured on steep south facing slopes immediately around the village. During the Soviet era, the collective’s summer pastures had been located about 20 km to the east, in the high valleys at the eastern end of the Kungoy Range, where sheep were trucked to their summer grazing. Today, however, the herder now drives his sheep on horseback about 25 km to the east to meadows near the border post of Karkara. Once at the summer pasture, the herder’s younger brother dwells in a yurt and looks after the animals for the summer months with his family, while the older brother returns to Keng-Suu to look after the family potato patch before the animals return in autumn.

4. Zaria Cooperative

Following independence, privatization of collectives proceeded rapidly in Kyrgyzstan, and by 1996, 82 percent of collectives had been privatized (Abazov 1999). Today, of the dozens of herding collectives that used to be located in Issyk-Kul Province, only four remain, all having been reorganized as private, worker-owned cooperatives, namely the Zaria Cooperative and the Aikol Cooperative on the south side of Lake Issyk-Kul, and two collectives in Tüp and Ananevo on the north shore of the lake.

The Zaria Cooperative is based in the town of Ak-Suu located 10 km east of Karakol, and is a former collective farm that was originally founded in 1931. Outwardly, it would at first appear little has changed at the cooperative since independence. A bulletin board labeled “Kolkhoz News” hangs in the lobby of the administration building, offices chatter with the noise of bulky Russian typewriters, Lenin portraits adorn office walls, and accounts in the cooperative storehouse are still added on an abacus.

However, the scale of operations has been downsized considerably over the past 15 years. At its height in 1989, the cooperative had 1200 workers, 42,000 sheep, and 2000 cows. Today the cooperative employs 500 workers, both Kyrgyz and Russian, and has the following livestock holdings: 3,500 sheep, 300 goats, 700 yaks, 600 cows, and 340 horses. Sheep kept by the collective today are predominantly introduced crossbreeds of fine-wool sheep, rather than indigenous breeds raised for meat.

The cooperatives herds are distributed based on animal type over a large stretch of eastern Issyk-Kul Province. Yaks are kept year round far to the south in the syrtlands

across the Terskey range, in tributary valleys of the main Sary-Jaz Valley between the settlements of Koyluu and Engilchek. The cooperative's cows are kept to the northeast, near Santash, not far from the Karkara border post. From about May 15th to Sept 15th each year, the cooperative's sheep continue to be pastured on its Soviet-era summer pastures immediately above Ak-Suu in the connected Arashan Valley and Ak-Suu Valleys. The remaining eight months of the year the sheep are kept in pastures immediately around Ak-Suu or housed in winter sheds on the outskirts of town, where they are fed supplementary fodder such as sain foin, barley, peas, and hay.

The cooperative's pastures are leased on a five to ten year basis. On the syrtlands, 2800 ha are leased at 21 som/ha from the oblast government. In the Arashan and Ak-Suu Valleys, 200 ha of land are leased from the Ak-Suu Forest Collective for 34 som/ha. Finally the cooperative leases an additional 800 ha of pasture for 3.50 som/ha from the district (Russian: *raion*) government in the immediate vicinity of the town of Ak-Suu.

During the Soviet era the meat the cooperative produced was immediately sold to state owned meat processing plants in Karakol and Balykchy. Today, the cooperative continues to market its meat to state owned institutions such as local hospitals, kindergartens, an old age home in Cholpon-Ata, and the Jergalan and Jeti-Oguz mineral spas (Russian: *kurort*). In addition to livestock, the cooperative also grows potatoes, wheat, cabbage, carrots, and apples, and receives support from the government in the form of credit. The cooperative's milk is sold at the Ak-Jalgaa dairy in the town of Kyzyl-Suu, located 50 km west of Ak-Suu. Somewhat surprisingly, neither yak wool nor yak milk is harvested.

In the Arashan Valley, four herders from the cooperative dwelled in cabin tents with their families as they managed the collective's sheep holdings, overseeing about 450 sheep each. These cooperative members lived much the same as individual herders and families in the Arashan, Karakol and Jeti-Oguz did, with the summer migration from their homes in Ak-Suu being about a two to three hour, 15 km horse ride up the mountain from town.

5. Aikol Cooperative

The Aikol Cooperative's administrative headquarters are in the town of Bokonbaev, located on the south shore of Lake Issyk-Kul about 130 km southwest of Karakol. The cooperative's origins lie in the initial phase of collectivization that created dozens of workmen's cooperatives (Russian: *artel*) in Kyrgyzstan in 1929, six of which were merged in 1956 to form Bokonbaev's Lenin Collective Farm. At its peak in 1989, the collective's livestock holdings included roughly 66,000 sheep, 400 cows, 1200 yaks, and 700 horses. The collective was officially disbanded in 1996 and reorganized shortly thereafter as the Aikol Cooperative, reduced in size from 700 to 500 workers.

Today the cooperative is primarily a meat producing operation, with livestock holdings that include about 8000 sheep, 2000 yaks, and 600 horses. At present the cooperative has no cows, although individual workers privately own milk cows. The reason for this has

largely to do with geography. Bokonbaev is located on an extremely arid section of the lakeshore that is essentially desert with little pastureland, and consequently the nearest dairy plant where milk could be sold is about 100 km away, making it extremely disadvantageous for the cooperative to keep dairy cows.

Primary markets for the cooperative's animals and meat are in Bishkek and Tokmak, a large town on the Kazakh border 60 km east of Bishkek. Since meat is cheaper in Kyrgyzstan than in Kazakhstan, many Kazakh buyers purchase live animals from the cooperative for slaughter in Kazakhstan. Yak meat is sold directly to sausage factories, while a large part of the cooperative's meat is bartered for basic supplies, such as potatoes, which the cooperative doesn't produce itself.

The cooperative's livestock are kept 50 km south of Bokonbaev across the Terskey range, in the highland valleys around the 2800 m high herding center of Archaly. However, the road distance between Bokonbaev and Archaly is much longer, at about 280 km, via the town of Kochkor in Naryn Province. Archaly was established in Soviet times as a "cultcenter", and has retained the usual cultcenter amenities including a medical clinic, school, several retail shops, and technical workshops for repair of tractors and the like. In winter animals are pastured around the community of Archaly and in summer are driven eastward a short distance, on the order of 15 to 20 km, to summer pastures in the Archaly Valley to the southeast and in the Balgart Valley to the northeast. Prior to independence, the collective's animals were driven much further eastward up the Burkhan Valley some 50 km to the Kalcha Valley. Today, however, with 58,000 fewer sheep, the collective no longer needs to use these distant pastures. Both meat and live animals are driven from Archaly to market by truck.

At Archaly 150 ha of pastures are set aside each year for haying, typically producing 200 to 300 tons of hay to be used as feed in the event of a winter emergency, such as during exceptionally deep snowfalls. Formerly the Lenin collective had 2740 ha of arable land, about half of which has since been sold to individual farmers. However, the cooperative has retained 1400 ha where it now plants wheat, barley, and sain foin for seed production, although a limited amount of barley is harvested for animal feed.

Each spring animals privately held by cooperative members are driven east from Bokonbaev, up the Ton Valley, and across a pass in the Terskey Range immediately south of the village of Tosor, to summer pastures at 3300 m in the upper Uchemchek Valley. Today, cash wages for collective members are typically about 1200 som per month, although there are also dividends on cash sales.

6. Turgon and Sary-Jaz Valleys/Ak-Shirak and Ertash Valleys

In addition to the areas discussed above where the practice of transhumance is still widespread, the author also made visits to several extremely remote valleys of Issyk-Kul Province, not far from the Chinese and Kazakh borders. The most notable phenomenon in these areas is that after decades of year round intensive use by the Soviet-era herding

collectives, they have been almost completely abandoned by semi-nomadic livestock herders, since without state support it is no longer economically feasible to graze animals in these remote areas. Yet, even the most remote corners of Kyrgyzstan, a few families persist in eking out a living through herding.

The Türgön Valley begins just above the village of Ak-Bulak, located about 40 km east of Karakol. During the second week of August, a cursory survey of a 30 km stretch of the Türgön Valley between the forestry collective camp in the lower valley and the base of the 3800 m high Chong Pass revealed only five herding camps totaling five yurts, one cabin trailer (Russian: *vagonchik*), and one house. Total animal numbers visible were on the order of 450 sheep, 100 horses, and 40 cows. These numbers seemed remarkably low at the height of summer in a well-watered valley with abundant meadows and easily accessible by a paved highway in good repair. However, even a short distance of 40 km from the bottom of the valley to the Sunday livestock market in Karakol appeared to make the Türgön Valley too remote for use by large numbers of individual herders.

South of Chong Pass, over a 75 km stretch of the Sary-Jaz Valley between the base of the pass and the tin mining community of Engilchek, only four herding camps were observed consisting of one yurt and three former collective winter camps with permanent structures. Total animal numbers visible were on the order of 200 sheep, 30 cows, 10 yaks, and 6 horses. Although there were undoubtedly a number of other camps scattered amongst the major side valleys of this remote area, including the Zaria Cooperative's 700 yaks, the general impression obtained was that the lands have largely been abandoned by semi-nomadic herders who, as individual herders, now prefer living closer to transportation links and towns with schools, medical care, and markets.

The Ak-Shirak and Ertash Valleys are both 90 km long tributary valleys of the Sary-Jaz River, which are located to the southwest of Engilchek. These valleys are only accessible from the Barskoon/Kara-Sai/Ak-Shirak highway which begins at the town of Barskoon located on the southern shore of Lake Issyk-Kul, 80 km southwest of Karakol. Since independence, the stretch of this highway south of the Kumtor Goldmine has not been repaired, and is impassable for much of the year. Most stream culverts have washed out, and the middle span of the bridge across the Kara-Sai River has collapsed and never been repaired. The highway is completely closed by avalanches and deep snow from early January to late April, and intermittently thereafter by floods resulting from summer rains and melt off of snow and glaciers. Difficult to obtain military border zone permits are required to travel along the highway beyond the Kara-Sai military post for both foreign nationals and Kyrgyz citizens, including those who reside in the border zone, contributing to the further isolation of the region.

While largely empty now, the Ak-Shirak Valley was formerly occupied year round by the Pobeda Collective Farm which was based in Svetlaya Polyana, located 30 km west of Karakol on the south shore of Lake Issyk-Kul. At its height, the collective had 30,000 sheep and 50 winter camps set in the side valleys of the Ak-Shirak and Kakshaal Ranges. For five months each year, from about Dec 1st to May 1st, animals were grazed immediately around winter camps, particularly on well exposed south facing slopes and

in the pastures of the open Ak-Shirak Valley. For the remaining 7 months of the year, animals were driven to snow-free summer pastures in high side valleys where yurt camps were set up, typically short five to ten km journeys from winter camps.

The western Ertash Valley had been occupied year round by about 20 herders from the Druzhba Collective Farm, based in the village of Konkino located 10 km west of Karakol, who oversaw roughly 10,000 sheep, 1500 yaks, and about 125 horses. The eastern Ertash Valley had been occupied year round by about 20 herders from the Ak-Terek State Farm (discussed in the Chong-Jargalchak Valley section above), who oversaw 15,000 sheep, 1000 yaks, and 125 horses. Winter camps of these two collectives consisted of wood or adobe cabins located in the snow free bottom of the deep Ertash Valley, while in summer animals were driven up side valleys to high meadows where yurt camps were established below the ice fields of the Ak-Shirak, Koyluu, and Terskey Ranges.

During the Soviet era unpaved roads or truck tracks to both valleys had existed and were maintained. Each month food, coal for heating and cooking, generator fuel, and other supplies were trucked in, while animals, meat, and wool were trucked out. The cultcenter in the former tin mining community of Uch-Korgon was fairly accessible to herders in the Ak-Shirak and Ertash Valleys, being at most a day and a half horse ride away, and children of herders attended school there, living in the school dormitory during the school year. Today, in the absence of state support and subsidies, transhumance is no longer practiced in these valleys, and nearly all herders in the area have returned permanently to their home villages on the southern shore of Lake Issyk-Kul.

The largest employer in the Ak-Shirak and Ertash Valleys is now the Sarychat-Ertash Nature Reserve (Russian: *zapovednik*), Kyrgyzstan's largest protected area, which employs 14 locals as rangers, the majority of whom are from families that had formerly been members of the local collectives. Rangers' salaries are only 750 som/month, about US \$18.00. Consequently, due to their low salaries and four-month isolation from the outside world each year, rangers are forced to keep livestock to make ends meet. Presently, one ranger lives with his wife and daughter in the two-room adobe cabin at the former Koenduu winter camp of the Pobeda collective, located in the Ak-Shirak Valley. The camp is located in the southernmost section of the reserve, 15 km west of Uch-Korgon, and earlier had housed two herders who looked after 600 sheep. Living next to the power line connecting Engilchek with Barskoon, the family has enough electricity to power one light bulb in each room. The family keeps about 200 sheep including those of the ranger's mother-in-law who is the village doctor in Uch-Korgon, and also a few goats, milk cows, and horses. The family dwells in the camp year round, and graze their sheep in the immediate vicinity of the camp, rarely more than five km from their home. Each night the animals are herded into corrals adjacent to the family's home as protection from wolves, which also provides a convenient collection point for dung, the family's primary heating and cooking fuel. Although there appears to be sufficient grass for the family's animals at this time, the slopes surrounding the camp exhibit few signs of recovery from severe damage caused by overgrazing during the Soviet era, even 10 years after the nature reserve was created.

The Ertash Valley has been completely de-populated since the break up of the Soviet Union and dismantling of the collective system. The valley now forms the core zone of the nature reserve, and the rangers patrolling the park make use of the six remaining herders' cabins along the Ertash River for shelter while patrolling the valley. After centuries of occupation by semi-nomadic herders, as evidenced by the numerous stone tombs scattered throughout the area, the Ertash valley is being allowed to revert to wilderness, though Soviet-era grazing damage is still evident. No livestock remain in the valley apart from those animals owned by a ranger who resides at the extreme eastern end of the valley near the junction of the Ertash and Sary-Jaz rivers.

II. *Naryn Province*

Naryn, Kyrgyzstan's largest province, is located in central Kyrgyzstan. The province is dominated by a dozen major river valleys which separate mountain ranges that are typically 4200 m to 4700 m in height. The result of this geography is a landscape of high grasslands with little forest cover having a climate too cool for large scale farming but well suited to semi-nomadic livestock herding. With a population that was 98.7 percent ethnic Kyrgyz in 1999, and an economy dominated by livestock herding, Naryn is considered by many Kyrgyz to be the single region exhibiting the "purest" form of Kyrgyz culture, and said to be the Kyrgyz cultural heartland (Rowland 2002). Nomadic tradition runs deep in Naryn, and unlike other areas of Kyrgyzstan, even after 120 years of Russian domination many residents of the province do not speak Russian.

Of lands classified as agricultural in Naryn, 94.9 percent (2,626,400 ha), or 56 percent of the total area of the province, are classified as pasturelands (UNS 2003). In Naryn Province, the author visited pastoralists at seven herding areas, the Karakujur Valley, the village of Birlik, the Ichke Valley, Lake Chatyr-Kul, Lake Song-Kul, the upper Naryn River gorge, and the Ak-Sai Valley.

1. *Karakujur Valley*

The Karakujur Valley is a long, treeless, high valley located on the southern slopes of the Terskey Range. The valley begins at the settlement of Sary-Bulak located 70 km north of Naryn, the provincial capital, on the Bishkek-Naryn highway. The Karakujur collective was founded in 1933, and at the height of the collective period in 1989 almost the entire population of the valley, about 3000 people, belonged to the collective, which had roughly 70,000 sheep, 3000 goats, 2000 cows, 2000 yaks, and 2000 horses.

In the Karakujur Valley the author visited a winter camp 50 km to the east of Sary-Bulak, located at an elevation of about 2900 m just east the village of Jer-Kochku. By the third week of December there was already a half meter of snow on the ground in the valley bottom, however, this was considered normal, and not a cause for worry. The camp consisted of a large adobe house with a larger than average kitchen, dining room, and two

rooms used for sleeping. The main dining room also housed the family TV set, and was comfortably heated by a Soviet-style hot water radiator fueled by animal dung burned in the kitchen stove.

The household consisted of two married couples, three boys between the ages of about 3 and 14, a hired hand, and one grandmother. A fairly well off family, their livestock holdings consisted of 380 sheep, 4 goats, 15 cows, 240 yaks, and 60 horses, and the family leased about 300 ha of land for their animals at a price of 5.60 som/ha. Their summer pasture was located 25 km away in the 3300 m high Jalpak-Bel Pass area at the eastern end of the valley. While during the Soviet period animals had been driven there in trucks, they were now driven on foot. In winter, sheep and cows were pastured around the family home and on south facing slopes nearby, and were also fed hay from large stockpiles kept in the family's corral. Hay was cut in August from well-watered meadows on the Karakujur River floodplain adjacent to the family's home, these lands having been vacant all summer. The family's yaks and most of the horses remained on the summer pasture year round in the snowy pass area and were checked on periodically throughout the winter when jeep transportation was available.

2. Birlik

The village of Birlik is located in the At-Bashy Valley, 10 km west of the town of At-Bashy, the local district center. The village was formerly part of a collective headquartered in the village of Ak-Moyun, located about eight km to the east of Birlik. In Soviet times, the Ak-Moyun collective occupied summer pastures in the eastern Ak-Sai valley and the western Jangy-Jer Range.

The household visited consisted of a married couple with five sons and two daughters ranging, in age from about 12 to 28. The father was a mid-level civil servant for the local government, which paid a salary of about US \$20 per month. The family's home was typical of those in Kyrgyz villages, a combination of adobe construction and an eastern European style farmhouse layout with a barn set up across the yard from the house and the entire complex fenced off and accessed through a large metal gate facing the street. The home consisted of a large kitchen where the family ate by the fire, a large living room which most family members slept in, and a smaller backroom also used for sleeping. For fuel the family used poplar wood cut from the floodplain of the nearby At-Bashy River to start fires, which were sustained by burning sheep dung cakes cut from the ground inside the family's wintershed. Although the village had electricity, this was cut off in a rolling blackout for about an hour each evening, as occurred throughout the At-Bashy District.

The three youngest children attended the local secondary school, while the oldest daughter studied computer sciences at a university in Naryn. The three oldest boys worked in the village. One ran the family's shop, located outside the main gate of the family compound, which sold sundry items, such as crackers, hard candies, toothpaste, soap, thread, shoe polish, and the like. The oldest son was married, and lived with his

wife at the family's winter camp, located two kilometers away on the edge the village, where the family had inherited a herder's cabin with wintershed from the Ak-Moyun collective. The third son provided general help for the family's livestock operation which consisted of 100 sheep, a few goats, 40 yaks, 10 horses and 3 cows, and also a few chickens and turkeys.

From mid-June until mid-September, many family members moved to the family's summer pastures at a site known as Chatyr-Tash (Tent Rock) located near the eastern end of the Ak-Sai Valley, a distance of about 90 km from Birlik. The family had inherited a Kamaz truck with large bed, and an equal size trailer from the collective, which they used to transport animals to and from their summer camp each year, although some of the family's yaks remained at the summer pasture year round. At the summer camp, yurts were set up, however some family members needed to remain in the village through out the summer to look after the family's home, shop, and potato patch.

3. Ichke Valley

The Ichke Valley is located on the northwest facing slope of the At Bashy-Range, just northeast of the Ak-Beyit pass on the Naryn-Torugart highway. During the Soviet era, the valley had been occupied in summer by the Kyzyl-Tuu/Kara-Bulung collective, comprised of the two adjacent villages located about 25 km to the southeast of At-Bashy, which also had summer pastures on Lake Chatyr-Kul across the At-Bashy Range.

The summer camp visited in Ichke Valley was typical of the area, consisting of two yurts, occupied by a married couple and their three children, who were between the ages of about 5 and 12. The family also had a herding partner, 34 years in age, who apparently did not have a wife or children. The smaller of the two yurts functioned primarily as a kitchen and storage shed, with stove, low table, kitchen implements, food sacks, ropes, saddlery, and some tools. The larger yurt was where the family slept. Like most families in the Ichke Valley, the family was from the village of Kara-Bulung. Their livestock holdings consisted of 40 sheep, 10 cows, 1 horse, and a small number of other animals they were watching for neighbors in Kara-Bulung. The family's summer migration was about 45 km with animals driven on foot from Kara-Bulung, while their yurts were moved on top of a car. Their stay at their summer camp was of shorter duration than that of most herders in the region, lasting only two months arranged around the school year from when school let out in mid-June until mid-August when the family returned to the village to get the children ready for school again.

The family's yurts were homemade from felt gotten from their own sheep and willow saplings cut by the Kara-Suu River near Kara-Bulung. Activities at the camp included morning and afternoon milking of cows and horses, primarily for immediate personal use, driving horses out to pasture in a higher side valley in the morning, and herding the sheep to various areas. However the family seemed to be struggling, and their basic meal consisted of boiled potatoes flavored with a bit of fat from a boiled sheep back hanging on the wall in the kitchen yurt, along with the usual camp bread, tea, and milk.

4. Lake Chatyr-Kul

Lake Chatyr-Kul (Tent Lake) is located at an elevation of 3560 m between the At-Bashy Range to the north and the Chinese border at Torugart Pass to the south. During the Soviet-era the 50 km long lake basin was used as summer pasture by four collectives made up of eight villages from the Kara-Koyun Valley immediately to the southwest of At Bashy, namely the Kara-Suu/Diykan collective, the Kazybek/Jany-Kuch collective, the Kalinin/Terek-Suu collective, and the Kyzyl-Tuu/Kara-Bulung collective. At the height of the collective era in 1989, each collective kept 30,000 to 40,000 sheep, and altogether about 150,000 sheep summered in the lake basin. In the summer of 2004, however, only 10 herding families had established camps on the south side of the lake, while only two families had camps on the north of the lake. At most, present day livestock numbers around the lake may have been about 12,000 head, but were probably far less.

The herding camp visited at Chatyr-Kul was one of two camps located on the north side of the lake, and one of the most isolated camps visited. The encampment consisted of two large yurts occupied by a family from the village of Kara-Suu, including a grandfather, his three adult sons, one son's wife, and five children, of which one child was old enough to help with the herding activities. The family managed 800 sheep, 200 yaks, 30 cows and 30 horses, which were both their own and those of their neighbors in Kara-Suu. The family spent about three months each year at their summer camp from mid-June to mid-September. A truck brought the family's yurts, equipment, and supplies to their camp via a road around the western terminus of the At-Bashy range, a distance of 110 km. Sheep, yaks, and horses were driven on foot up the Kara-Koyun and Tash-Rabat Valleys, and over a 4040 m high pass of the At-Bashy Range, a journey of about 75 km which took three days to complete. However, the 30 cows the family watched were all transported to and from the camp by truck.

Camp activities included morning and evening milking of cows, yaks, and horses for immediate consumption in camp. Meals consisted largely of camp bread with butter and *kaimak* (cream de-watered by a centrifuge device), yogurt, and tea with sugar or jam. In the morning, one man drove horses out to pasture as a herd, while the others drove sheep and cows out to different pastures together. In the afternoon the grandfather instructed his oldest son in making saddlery by hand with homemade leather working implements, and this particularly family harvested yak wool for making ropes used to lash down felt yurt covers to the tent frame. In autumn, all animals were driven back to Kara-Suu where they were pastured in the immediate vicinity of the village.

5. Lake Song-Kul

Lake Song-Kul is located about 80 km northwest of Naryn. The lake sits at an elevation of 3025 m atop an isolated, grassy plateau that is ringed by mountains which fall off precipitously on all sides to plunging river gorges below. During the late Soviet period, improved gravel roads with raised beds were built into the lake basin from three

directions to facilitate access by herding collectives. However these roads have not been maintained since independence and are quickly washing out, though they were still passable in the summer of 2004.

There are only a few permanent structures in the basin, which is used almost exclusively as summer pasture. In spring animals are driven up canyons to the lake from villages in the river valleys below, and remain in the lake basin from about mid-June to mid-October. Yurts and equipment are transported to the lake in cars, jeeps, and trucks, with yurt camps in this area typically having three to five yurts. Yurt numbers in the basin have no doubt increased of late, since the area is a popular destination with European tourists and many herders advertise tourist accommodation on signposts along the road around the lake. A count from a vantage point above the lake on a clear afternoon revealed about 40 camps ringing the lake, with a total of about 130 yurts, and a few cabin trailers. Herd numbers were fairly large, with a cursory count that included about 500 sheep, 50 goats, 50 cows, and 35 horses grazing along a five kilometer stretch of the lakeshore that was occupied by five herding camps. Notably the local pastures were in excellent condition, showing only minor evidence of grazing damage, while the lake area had the largest concentration of goats the author was to see in Kyrgyzstan.

At the southernmost point on the lake, one herding camp visited belonged to a family from the village of Kurtka, located immediately adjacent to the larger village of Ak-Talaa on the Naryn River 30 km west of Naryn. The family consisted of a grandmother, a married couple, one female and two male siblings of the married couple, who were of high school age, and the couple's two young daughters. In June the men from the family drove the family's sheep, cows, and horses up the Song-Kul River gorge to the lake basin, a climb of about 1100 m over a distance of some 50 km that took one to two days on horseback. However, in spite of remaining active herders, from about mid-June until late-August the family seemed to be doing a much more lucrative business providing European tourists with accommodation in yurts, meals, and horses for hire, including many French, Hungarian, and Russian tourists at the time of the author's visit. In October the animals were driven back down off the plateau and pastured around the village.

6. Ak-Sai Valley

The Ak-Sai Valley is located 50 km due south of At-Bashy across the At-Bashy Range, immediately to the east of the Lake Chatyr-Kul basin. Driving out to the Ak-Sai valley on the Naryn-Torugart Highway in autumn, herders can occasionally be seen driving large herds back to winter camps in the Kara-Koyun Valley from some of the remotest summer pastures in use in Kyrgyzstan today. The Ak-Sai Valley itself is an extremely broad grassland plateau which runs just north of Naryn's Chinese border. The valley is about 100 km in length and 70 km across at its widest point, while the Ak-Sai River flowing down the center of the valley has a median elevation of roughly 3200 m. During the collective period, the valley was occupied by two large herding collectives, the Ak-Jar collective, and the Acha-Kaindy/Bash-Kaindy collective, all three villages being located within five kilometers of At-Bashy.

In Soviet times herders and animals were transported up to 175 km by road from the At-Bashy area to summer pastures in the Ak-Sai. Numerous winter camps also existed, and continue to exist in the Ak-Sai, comprised of lone houses situated in ravines set in the low foothills of the Kakshaal Range south of the Ak-Sai River. However, in the Ak-Sai transhumance is of a horizontal nature, rather than the vertical migration observed at other sites in eastern Kyrgyzstan, with herders who reside in the valley year round migrating anywhere from 2 to 20 km from the base of the mountains out to camps in the center of the valley in summer.

The valley is extremely isolated, only being accessible by two improved dirt roads which pass around either end of the At Bashy Range. However, as throughout Kyrgyzstan, the condition of these roads has deteriorated rapidly since the break up of the Soviet Union, with many culverts having been washed out, and the foundation of the only bridge across the Ak-Sai River at Köl-Suu being severely undercut by bridge scour and requiring major repairs to prevent an imminent collapse. The valley is further isolated by the presence of six military checkpoints in and around the valley at Korgon-Tash, located just south of Ak-Beyit Pass, Torugart, Eselek, Kurumdu, Köl-Suu, and a checkpoint just south of Kyndy Pass. At each checkpoint, all travelers must present difficult to obtain military border zone permits, including Kyrgyz citizens resident in the valley, which has the effect of sharply curtailing the flow of traffic into and out of the valley.

During the Soviet era, numerous small settlements with permanent structures were built to support herders in the Ak-Sai Valley, including small settlements at K  k-Adyr, Ak-Sai Center, New Ak-Sai Center, and Chatyr-Tash. With the exception of New Ak-Sai Center, all of these small settlements have been completely abandoned and are now in ruins. New Ak-Sai Center had been constructed in the center of the valley as the area's main cultcenter, with the usual cultcenter amenities of school with children's dormitory, medical clinic, pharmacy, community center, library, and shops. Today, of a community that numbered 40 families at the time of independence, only eight remain, primarily those of former highway maintenance workers who are now unemployed and face a bleak existence, having to travel 125 km to At-Bashy to buy supplies or obtain medical services. While all of the cultcenter's public services have ceased to function, including the school, electricity is still provided to the community free of charge.

In mid-October in the Ak-Sai, few animals were to be seen around winter camps, with herders typically looking after fewer than 30 sheep or 10 horses, though the area is said to be ideal terrain for raising yaks. At one point two large Kamaz trucks were seen driving hay for winter feed into the Ak-Sai from the At-Bashy Valley. However it is clear that population of the valley has been greatly reduced since independence.

Discussion

From this survey it has been seen that, in spite the collapse of the collective system and the end of generous subsidies the Soviet government provided herding collectives

Appendix A – Semi-Nomadic Livestock Herding in Kyrgyzstan

practicing transhumance, a large segment of the population of eastern Kyrgyzstan persists in supporting itself through semi-nomadic livestock herding. However, with disintegration of the Soviet Union large numbers of herders have found themselves to be individual livestock owners for the first time in their lives, and possibly in the history of their people, by which the burden of risk now has devolved upon the individual rather than on the collective or clan. The advent of private ownership of livestock in Kyrgyzstan was quickly followed by an ongoing process of social reorganization amongst semi-nomadic herders, over the course of which herders have adopted widely varying strategies for survival, including:

- Remaining in large herding collectives practicing transhumance which have been reorganized as independent cooperatives;
- Banding together in partnership with friends, neighbors, and others outside the immediate family to facilitate transhumant practices;
- Both short (<20 km) and long (>20 km) distance migration as a single family unit;
- Both short and long distance migration as an extended family unit;
- Herding a mix of personal livestock and that of paying “clients”;
- Diversifying income generating activities to include not only herding, but also activities such as planting of staple food crops like potatoes and wheat, catering to tourists, or having a family member take a job in the home community.
- Ending all nomadic practices completely and remaining at one location year round, pasturing reduced numbers of animals immediately around the home village.

This process of social reorganization, combined with the collapse of Soviet-era markets for livestock products, has been accompanied by the rise of an informal economy based primarily on barter rather than cash, in which herders barter meat for items such as potatoes or other necessities, only generating limited cash incomes through the occasional sale of live animals, meat, milk, skins, and wool in local bazaars.

Herders persist in practicing transhumance in some of the most remote mountain valleys in Kyrgyzstan, but with the demise of the collective system and accompanying support infrastructure livestock numbers have fallen dramatically, and it has become economically unfeasible for most individual herders to make long summer migrations. Consequently a long, 70 km wide swath of remote grazing lands along the Chinese border between Lake Chatyr-Kul in the west and Peak Khan-Tengri in the east, which had been intensively used by the collectives prior to 1991, has been largely de-populated. In general, most herders formerly residing on these remote lands now live in their home villages along major transportation routes with the attendant markets, schools, and

medical clinics. Privatization of livestock and decreased mobility of herders has in turn led to increased use of pastures immediately around villages, resulting in extensive pasture damage, including proliferation of unpalatable woody plant species, and large slope failures in these areas (Daviesson 2001).

The Soviet Union made great strides in developing the herding regions of Kyrgyzstan, vastly improving the quality of life of herders by construction of improved roads, power lines, schools, medical clinics, and potable water systems for every community in the study area, even providing generators to many remote herding camps. However, since 1991 these gains have slowly been erased through a process of “de-development”, whereby all forms of public infrastructure are slowly deteriorating due to a lack of funding for repairs, with the most remote communities being the most severely affected by the process. One result of “de-development” has been the creation of a thriving business in rural Kyrgyzstan whereby broken down collective era agriculture machinery and vehicles are sold to Chinese scrap metal dealers, further reducing the likelihood that the benefits of Soviet-era mechanization will be revived by herders anytime in the foreseeable future. The end of subsidized coal for Kyrgyzstan following independence was accompanied by a problem of accelerated deforestation in areas having extensive forest cover, and also deforestation of shrublands and wooded areas in riparian corridors throughout Kyrgyzstan (MEP 1998). As a result of dwindling fuel supplies, there is a renewed reliance among rural dwellers on their traditional fuel source, dung cakes, which are now the primary source of fuel for cooking and heating used by most herding families (Jangaracheva, 2002)

Another problem now facing herders in independent Kyrgyzstan is a traditional one, which had long been attenuated by the collective system, that of wolf kills. While in the collective era no single individual felt the financial blow of collectively owned animals being lost to wolf kills, animals lost to wolves now can constitute a serious financial setback for individual herders, as one herder talked to in a remote area of the Naryn River gorge was to lament after losing three horses to wolves in one week (Hazell 2001).

Thus it is not surprising that nearly all herders interviewed in this survey looked back on the Soviet-era with great longing and a sense of abandonment. A number of herders even considered themselves unemployed because monthly salaries no longer arrive from the collective, even though they are fully occupied with their own livestock, small scale farming, and other private businesses. This sense of loss has even been passed down to a younger generation with few memories of the Soviet Union who have learned to lament its passing from their elders.

Conclusions

This survey has shown that semi-nomadic livestock herding in post-soviet Kyrgyzstan continues to be a time-honored tradition that supports a large segment of the Kyrgyz population. However since the arrival of the Russians in the Tian Shan in the second half of the 19th century, Kyrgyz transhumant practices have been significantly modified, first

Appendix A – Semi-Nomadic Livestock Herding in Kyrgyzstan

with the displacement of Kyrgyz herders by Slavic farmers, and secondly by forced collectivization under Stalin. In the course of these events, herd composition has shifted from horse dominated to sheep dominated herds, semi-nomadic herders were settled in permanent villages, and a fairly uniform regimen of state subsidized herding practices was instituted which placed the highest priority on wool production. While the brutal implementation of the collectivization process initially resulted in great loss of livestock and human life, in post-war years the collective system provided many social and economic benefits to herders.

In the wake of the Soviet collapse herders have been left without state support and as a result many are now quite destitute. Apart from cooperative members, all herders have been forced for the first time to create their own individual regimes of transhumance due to both the void left by the breakup of herding collectives and the absence of ancient clan practices extinguished by the Soviet state in the late 1920's. Post-Soviet organization of transhumance has produced diverse forms that reflect not only the conservatism of earlier collective and clan practices, but also a newer individualism where some herders, either by choice or lack of choice, are going it alone as a family unit. Many former herders have given up the practice of transhumance altogether for the relative convenience of life in the village. Yet in spite of the multitude of changes in Kyrgyz society over the last 150 years, in many respects the lives of the nation's semi-nomadic herders go on much as they always have in the Tian Shan, with herders driving their animals to summer pastures along ancient livestock routes and unfurling their yurts in high mountain meadows for several months each year.

However Kyrgyz herders face many new challenges in keeping their semi-nomadic way of life viable in years to come. Although semi-nomadic livestock herding has never been an easy life, the level of hardship involved has increased dramatically since independence brought the end of all state support for herders, who now must be completely self-reliant. Furthermore, without removal of barriers to broader regional trade in livestock products, it is unlikely the lives of Kyrgyzstan's pastoralists will improve significantly in the foreseeable future. Although Kyrgyzstan's herders face large challenges today, nomadic pastoralism remains at the core the Kyrgyz identity as evidenced by the use of the use of a circular yurt roof frame as the national symbol, and by the thousands of urban Kyrgyz who return to ancestral villages each year to spend summer vacations drinking koumiss and visiting the yurts of relatives who remain on the land. In spite of the changing times it appears that the practice of transhumance will continue in Kyrgyzstan for some time to come.

References for Appendix A

- Abazov, R., 1999. Economic migration in Post-Soviet Central Asia: The case of Kyrgyzstan. *Post-Communist Economies*. 11(1):237-252.
- Babu, S., W. Reidhead, 2000. Poverty, food security, and nutrition in Central Asia: a case study of the Kyrgyz Republic. *Food Policy*. 25(2000):647-660.
- Bloch, P. 2002. Kyrgyzstan: almost done, what next? *Problems of Post-Communism*. 49(1):53-62.
- Chemonics International Inc./USAID 2003. Material for the seminar on leasing of pastures. Kyrgyz Land Reform Project. www.landreform.kg. Chemonics International Inc. Bishkek. Russian and Kyrgyz language. 36 pp.
- Davieson, R., G. Fet 2001. Biodiversity assessment for Kyrgyzstan. BIOFOR Chemonics International Consortium Task Order 803: Country Biodiversity Assessments in Central Asia. USAID Contract Number: LAG-I-803-99-00014-00. Chemonics International Inc. Washington D.C. 67 pp. <http://www.biofor.com/reports.htm>. Accessed 19 May 2005.
- Duncan, A., 1994. Agricultural and economic reform issues in Kyrgyzstan, former Soviet Central Asia. *Food Policy*, 19(1):85-87.
- Emeljanenko, T. 1994. "Nomadic year cycles and cultural life of Central Asian livestock breeders before the 20th century" in *Nomads in Central Asia: Animal husbandry and culture in transition (19th – 20th century)*. pp. 37-68. Royal Tropical Institute. Amsterdam.
- Fitzherbert, A. 2000. Country Pasture/Forage Resource Profiles: Kyrgyzstan. Crop and Grassland Service, Plant Production and Protection Division, United Nations Food and Agricultural Organization. Rome.
<http://www.fao.org/ag/AGP/AGPC/doc/Counprof/kyrgi.htm>. Accessed 19 May 2005.
- German Agency for Technical Cooperation (GTZ), 1999. Environmentally sound land use development in the Issyk-Kul biosphere territory. GTZ. Bishkek. 225 pp.
- Grousset, R., 1939. *The Empire of the Steppes: A History of Central Asia*. Rutgers University Press. New Brunswick, NJ. 687 pp.
- Hazell, C.J., 2001. The status of the wolf population in post-Soviet Kyrgyzstan. *Endangered Species Update*. 8(4):142-146.
- Howell, J. 1996. Coping with transition: insights from Kyrgyzstan. *Third World Quarterly*. 17(1):53-68.

Appendix A – Semi-Nomadic Livestock Herding in Kyrgyzstan

Humphrey, C. and D. Sneath 1999. *The End of Nomadism?* Duke University Press. 355 pp.

Jangaracheva, M., A. Shanazarov, M. Shuler, B. Namazbekov, A. Abylgazieva, M. Glooshkova, T. Tretyakova, T. Chernook 2002. National report: human development in mountain regions of Kyrgyzstan. United Nations Development Program. Bishkek. 86 pp. <http://www.undp.kg/english/publications.phtml?2>. Accessed 19 May 2005.

Karypkulov, A., editor 1995. *Ysyk-Kol Region Encyclopedia*. Kyrgyz Encyclopedia Chief Editorship. Bishkek. Kyrgyz, Russian, and English languages. 656 pp.

[MEP] Ministry of Environmental Protection 1998. *Kyrgyz Republic Biodiversity Strategy and Action Plan*. MEP. Bishkek. 128 pp. English and Russian language. http://www.undp.org/bpsp/nbsap_links/nbsap_links.htm. Accessed 19 May 2005.

Popova, L. 1994. “Modern animal husbandry in Central Asia: a call for research” in *Nomads in Central Asia: Animal husbandry and culture in transition (19th – 20th century)*. pp. 69-87. Royal Tropical Institute. Amsterdam.

Rowland, R. 2002. National and regional trends in Kyrgyzstan, 1989-1999: Results from the recent census of Kyrgyzstan and 2001 update. *Eurasian Geography and Economics*. 43(7):529-581.

Schillhorn van Veen, T.W. 1995. *The Kyrgyz Sheep Herders at a Crossroads*. Paper 38d. Pastoral Development Network Series. Overseas Development Institute. <http://www.odi.org.uk/pdn/papers/index1.html>. Accessed 19 May 2005.

Schmidt, P. 2001. The scientific world and the farmer’s reality: agricultural research and extension in Kyrgyzstan. *Mountain Research and Development*. 21(2):109-112.

Soucek, S., 2000. *A History of Inner Asia*. Cambridge University Press. Cambridge. 369 pp.

Spoor, M., 1995. Agrarian transition in the former Soviet Central Asia: a comparative study of Uzbekistan and Kyrgyzstan. *The Journal of Peasant Studies*. 23(1):46-63.

Suleimenov, M. P. Oram, 2000. Trends in feed, livestock production, and rangelands during the transition period in three Central Asia countries. *Food Policy*. 25(2000):681-700.

Tabyshalieva, A. 2001. *Kyrgyzstan: common country assessment*. United Nations System. Bishkek. 135 pp. <http://www.undp.kg/english/publications.phtml?3>. Accessed 19 May 2005.

Tashamatov, A., F. Aknazarov, A. Juraev, R. Khusanov, K. Kadyrkulov, K. Kalchayev, B. Amirov 2000. Food policy reforms for sustainable agricultural development in Uzbekistan, the Kyrgyz Republic and Tajikistan. *Food Policy*. 25(2000):719-732.

[TCA] Times of Central Asia (on-line), 2002. The golden hills. May 23, 2002. Bishkek. www.times.kg. Accessed May 2002.

Tynaliev, K. 1994. Conditions and problems of the pastoral economy of Kyrgyzstan. *Land Reform, Land Settlement, and Cooperatives*. 1994:35-40. U.N. FAO. Rome.

[UNS] United Nations System, 2003. Common country assessment. UNS. Bishkek. 70 pp. <http://www.undp.kg/english/publications.phtml?3>. Accessed 19 May 2005.

Van Leeuwen, C. 1994. “Animal husbandry in Central Asia: rooted in the past” in *Nomads in Central Asia: animal husbandry and culture in transition (19th – 20th century)*. pp. 9-36. Royal Tropical Institute. Amsterdam.

Wilson, R. 1997. Livestock, pastures, and the environment in the Kyrgyz Republic, Central Asia. *Mountain Research and Development*. 17(1):57-68.

Appendix B:

The Place of the Tian Shan amongst the World's Highest Mountains Ranges

The Place of the Tian Shan amongst the World's Highest Mountains Ranges

Table B1. The Place of the Tian Shan amongst the World's Highest Mountains Ranges

Rank	Range	Highest Peak	Elevation	Country	Approximate Latitude and Longitude
1.	Himalaya	Mt. Everest, Qomolangma, Sagarmatha	8848 m 29,028 ft	Nepal, China (Tibet)	28° N, 87° E
2.	Karakorum	Godwin Austen, K2	8611 m 28,250 ft	Pakistan	36° N, 75° E
3.	Kunlun Shan	Ulugh Muztagh	7723 m 25,338 ft	China (Xinjiang & Tibet)	36° N, 87° E
4.	Hindu Kush	Tirich Mir	7690 m 25,230 ft	Pakistan	36° N, 72° E
5.	Da Xue Shan	Gongga Shan, Minya Konka	7590 m 24,902 ft	China (Sichuan)	29° N, 120° E
6.	Pamirs	Peak Ismail Semani, Peak Communismus	7495 m 24,590 ft	Tajikistan	39° N, 72° E
7.	TIAN SHAN	Peak Pobeda, Jengish Chokusu, Tuomuer Feng	7439 m 24,406 ft	Kyrgyzstan, China (Xinjiang)	42° N, 80° E

Table B2. The Place of Kyrgyzstan's Peak Pobeda with Respect to the Highest Peak on Each Continent

Rank	Continent	Peak	Range	Elevation	Approximate Latitude and Longitude
1.	Asia (Nepal, China)	Mt. Everest, Qomolangma, Sagarmatha	Himalaya	8848 m 29,028 ft	28°N, 87°E
	Asia (Kyrgyzstan, China)	Peak Pobeda, Jengish Chokusu, Tuomuer Feng	TIAN SHAN	7439 m 24,406 ft	42°N, 80°E
2.	South America (Argentina)	Aconcagua	Andes	6960 m 22,834 ft.	33°S, 70°W
3.	North America (United States)	Denali, Mt. McKinley	Alaska	6194 m 20,320 ft.	150°W, 63°N
4.	Africa (Tanzania)	Kilimanjaro		5895 m 19,340 ft.	3°S, 38°E
5.	Europe (Georgia, Russia)	Elbrus	Caucasus	5642 m 18,510 ft.	43°N, 43°E
6.	Antarctica	Vinson Massif	Sentinel	5140 m 16,864 ft.	78°S, 85°W
7.	Australia	Kosciusko	Great Dividing Range	2230 m 7310 ft.	37°S 148°E

Appendix C:

The Aral Sea, Water Rights in Central Asia, and Kyrgyzstan

The Aral Sea, Water Rights in Central Asia, and Kyrgyzstan

Much has been written about the problem of the Aral Sea, an ecological disaster of the same order of magnitude as the destruction of the Amazon Rainforest and the desertification of the Sahel (e.g. see Komarov 1980, Feshbach 1992). Since the ill-fated decision by Soviet planners to turn the deserts and steppes of the lower Amu Darya and Syr Darya River basins into giant cotton plantations in the 1960's, a number of environmental problems of staggering proportions have emerged. Most visible is the drying up of the Aral Sea, the surface area of which shrank by 56 percent between 1960 and 1995, from 68,320 sq. km to less than 30,000 sq. km (Vinogradov 2001). Over the same period the total water volume of the Aral shrank by nearly 75 percent, while the total inflow to the lake was reduced from 280 cubic kilometers in the five-year period from 1956 to 1960 to just 10 cubic km in the period from 1981 to 1985, all as a result of diverting water from the Aral's source rivers to irrigate cotton fields developed in the 1960s and 1970s (Vinogradov 2001).

One of the first impacts of this agricultural policy was the destruction of the Aral Sea's fisheries and fishing economy. The Uzbek town of Moynaq and its erstwhile fishing fleet are now surrounded by sand at a distance of 80 km from the Aral's receding shoreline. The town's population has dropped by over 70 percent, from 45,000 in 1960 to 13,000 in 1995, while many of those who remain are now unemployed (Vinogradov 2001). Of 24 species of fish that were found in the Aral Sea in 1960, 12 were considered to be commercially valuable, however, by the early 1990s only four fish species remained due to the increasing salinity and contamination of the shrinking sea (Perera 1993).

With creation of the cotton monocrop, the application of large amounts of fertilizers and insecticides became necessary to keep the cotton plantations viable, which led to severe contamination of not only the Aral Sea, but also surface and groundwater used for human consumption throughout the Aral basin. Meanwhile, toxic sandstorms of salts and agricultural chemicals began to blow off the drying sea bed, leading to increased regional desertification. At the same time the climate became more arid, and seasonal temperature range more extreme, with hotter summers and colder winters in the absence of the temperature regulating effects of the Aral Sea's waters.

These developments have had a devastating effect on human health in the Aral Basin, particularly in the Karakalpak Republic of northern Uzbekistan, where health disorders such as typhoid, hepatitis A, anemia, kidney disease, liver disease, stomach cancer, cancer of the esophagus, birth defects, thyroid dysfunction, and general immune system dysfunction are rampant, with infant mortality being three times higher than normal for the region, while life expectancy is 5 to 10 years lower than for other areas of the former Soviet Union (Perera 1993, Vinogradov 2001).

At present, over 40 percent of the population of the former Soviet Central Asian republics is employed directly by agriculture, which is based, for most part, on irrigation in the arid region, where rainfall is generally less than 200 mm per year in the cotton growing areas

(O'Hara 2000). Consequently, with regional unemployment rates already high, there is little chance of cotton fields being taken out of production and less water being diverted for irrigation to a particular area until the soil is so salinized as to be completely unproductive.

Rights to water from the Amu Darya and Syr Darya Rivers, the primary sources of irrigation water in Turkmenistan, Uzbekistan, and western Kazakhstan, are a highly contentious matter. The Amu Darya has an average annual discharge of 78.5 cubic km, while the Syr Darya has an average annual discharge of 37.2 cubic km. The peak flows of these rivers occur between April and July, during the period corresponding to maximum melt-off of snowfall and glaciers in the Pamir and Tian Shan Ranges (O'Hara 2000). Combined, the Amu Darya and Syr Darya account for about 90 percent of the usable water in the Aral Sea Basin, of which 55.4 percent originates in Tajikistan, while Kyrgyzstan is the source of 25.3 percent of this water. Thus together, Tajikistan and Kyrgyzstan are the source of the vast majority of all available water in Aral Sea basin (O'Hara 2000).

However, as a hangover of Soviet central planning, water rights for each of the five Central Asian republics are allocated in inverse proportion to any given republic's ability to generate water flow, an arrangement formalized by a 1992 agreement between the five independent republics in which it was decided that Soviet-era water allotments should be perpetuated unaltered (O'Hara 2000). Thus Kyrgyzstan is only entitled to use 24 percent of all water flow generated on its territory, or 11.6 cubic km, which includes the right to use just one percent of the flow from the Kyrgyz Republic's share of Syr Darya basin, while at the same time Uzbekistan is entitled to 51.7 percent of the usable flow of the Syr Darya, Kazakhstan's share is 38.1 percent, with the remainder remaining 9.2 percent allotted to Tajikistan (Table C1, World Bank 1995, O'Hara 2000).

Table C1: Water Allocations as a percentage of total usable flow determined by the 1992 International Commission on Water Management Coordination agreement.

Country	Syr Darya Basin Water Allocation (percent)	Amu Darya Basin Water Allocation (percent)
Kyrgyzstan	1.0	0.4
Tajikistan	9.2	13.6
Uzbekistan	51.7	43.0
Kazakhstan	38.1	0
Turkmenistan	0	43.0
Total	100.0	100.0

Source: O'Hara 2000

While from an agricultural irrigation standpoint only having access to 1.0 percent of the usable flow from the nation's Syr Darya Basin may not be a large issue for the Kyrgyz

Republic, as there is very little in the way of irrigated farmland in the nation's mountainous Syr Darya watershed, from an energy perspective it is an enormous problem. Kazakhstan and Uzbekistan are self-sufficient in fossil fuel, having tremendous reserves of oil, gas, and coal. However the Kyrgyz Republic is poor in fossil fuel resources and almost entirely dependent on fuel imports, and, consequently, is heavily dependent on its abundant water resources for generating hydro-electric power. Thus while international agreements obligate the Kyrgyz Republic to release water from its reservoirs in the spring and summer months to irrigate Uzbek and Kazakh cotton fields, in the absence of a reliable fossil fuel supplies Kyrgyzstan has little choice but to hold its water back to be released in December, January, and February during the peak electricity demand for winter heating and lighting. In doing so, the Kyrgyz Republic threatens the viability of a large proportion of the Uzbek and Kazakh agricultural economies, and threatens to further destabilize the entire region.

In order to resolve this conflict in national priorities concerning timing of water releases from Kyrgyzstan's reservoirs, it is in the interest of both Uzbekistan and Kazakhstan to purchase Kyrgyz hydro-electric power in summer, and also to ensure that Kyrgyzstan has a reliable winter supply of fossil fuel for its coal-fired electricity and heating plants so that irrigation water for cotton fields continues to arrive when needed. However, in practice this has not always been the case during the post-Soviet era, as occurred most recently in 2003, which was an exceptionally rainy year, prompting Kazakhstan and Uzbekistan to state that they didn't need summer water from Kyrgyzstan, while both nations also refused to buy Kyrgyzstan's summer power. This left Kyrgyzstan with water but no winter fossil fuel imports in exchange for its summer power and water releases. Given this predicament, Kyrgyzstan was left with little choice but to begin releasing its water in December of 2003 to generate power, flooding the Syr Darya River on short notice, and nearly causing the overtopping of Kazakhstan's Shardara Dam, which would have resulted in severe flood damage (Chadova 2004).

Following this event, a new agreement was reached between the three nations to barter Kyrgyzstan's water and power for Kazakh and Uzbek coal, tar, and gas. In addition, discussions were begun concerning the construction of a second large dam in Kyrgyzstan's Syr Darya basin, to be built below the Toktogul hydro-electric dam, Kyrgyzstan's largest. With the construction of a second dam funded by all three nations, Kyrgyzstan would have the ability to generate power from its upper Toktogul Dam with winter water releases, while capturing the released water in the proposed lower dam so that it could be stored until summer when needed for irrigating fields in Kazakhstan and Uzbekistan (Chadova 2004).

While construction of the second dam would go a long way towards strengthening Kyrgyzstan's energy security, upstream manipulations of water will in no way relieve the downstream crisis of the Aral Sea that has been growing in magnitude for nearly 50 years now, which is entirely the result of wasteful irrigation systems and water use practices, in particular the vast network of unlined canals and furrows that typically lose 50 to 90 percent of diverted water to infiltration and evaporation before ever reaching cotton plants (Feshbach 1992). Furthermore, it is in the present interests of downstream water

managers to ensure that even more water continues to be consumed so that future claims can be made for larger water allocations for further projects to expand irrigation systems to yet more of the Central Asian desert as older fields become too salinized for use.

In 1988 a state commission was set up by the central government of the Soviet Union to address the Aral Sea problem, which recommended increasing water flow to the Aral, upgrading primitive irrigation systems, construction of return flow canals to drain used irrigation water back to source canals, planting of salt resistant plants on the Aral Sea bed to keep down dust, and ending all further expansion of irrigation in the sea basin by 1991. However, while initial progress had been rapid, with disintegration of the Soviet Union in December of 1991, all further Aral Sea restoration efforts collapsed in the wake of the ensuing economic crisis and the competing interests of the five newly independent Central Asian republics (Perera 2003). To this date, effective restoration efforts for the Aral Sea have yet to be restarted.



Stranded fishing boats, Aral Sea, Moynaq, Karakalpak Republic, Uzbekistan.

References for Appendix C

Chadova, E. 2004. Central Asian PMs offer solutions to water crisis. *Times of Central Asia*. 15 January 2004. 6(2/253):6. Bishkek.

Feshbach, M. and A. Friendly, 1992. *Ecocide in the USSR: Health and Nature under Siege*. Basic Books. New York. 376 pp.

Komarov, B. 1980. *The Destruction of Nature in the Soviet Union*. M.E. Sharpe. White Plains, New York. 150 pp.

O'Hara, S. 2000. Central Asia's water resources: contemporary and future management issues. *Water Resources Development*. 16(3):423-441.

Perera, J. 1993. A sea turns to dust. *New Scientist*. 23 October 1993:24-27.

Vinogradov, S. and V. Langford 2001. Managing transboundary water resources in the Aral Sea Basin: in search of a solution. *International Journal of Global Environmental Issues*. 1(3/4):345-362.

World Bank 1995. *Kyrgyz Republic National Environmental Action Plan*. Report No. 13990-KG. Infrastructure, Energy, and Environment Division, Country Department III, Europe and Central Asia Region. Washington D.C. pp. 176
http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&id=000009265_3961029205653. Accessed 27 May 2005.

Appendix D:

Mammals of the Kyrgyz Republic

Mammals of the Kyrgyz Republic

Source: Vorobeev 2003

Index of Mammal Orders

Order Artiodactyla	Ungulates
Order Carnivora	Carnivores
Order Chiroptera	Bats
Order Insectivora	Insectivores
Order Lagomorpha	Rabbits
Order Rodentia	Rodents



Common Name

Latin Name

Notes

Order Artiodactyla

Argali/Marco Polo Sheep

Ovis ammon ssp.

2 Redbook Listed
Subspecies:
O.a. polii, O.a. karelini

Eastern roe deer,

Capreolus pygargus

Elk (U.S.)/Red Deer (U.K.)

Cervus elaphus

Goitered gazelle

Gazella subgutturosa

Saiga

Saiga tatarica

Siberian ibex

Capra sibirica

Wild boar

Sus scrofa

Red Book Listed
Red Book Listed

Order Carnivora

American mink

Mustela vison

Brown bear

Ursus arctos

Corsac fox

Vulpes corsac

Dhole/Red Wolf

Cuon alpinus

Eurasian badger

Meles meles

Eurasian lynx

Lynx lynx

European otter

Lutra lutra

Golden jackal

Canis aureus

Grey Wolf

Canis lupus

Marbled polecat

Vormela peregusna

Mountain weasel

Mustela altaica

Pallas's cat /Manul

Felis manul

Red fox

Vulpes vulpes

Snow leopard

Uncia uncia

Steppe polecat

Mustela eversmannii

Stoat

Mustela erminea

Introduced in 1956
Red Book Listed

Red Book Listed

Red Book Listed
Red Book Listed

Red Book Listed

Red Book Listed

Red Book Listed

Stone marten	<i>Martes foina</i>	
Turanian/Caspian tiger	<i>Panthera tigris virgata</i>	Extinct in Kyrgyzstan in early 20 th Century
Weasel	<i>Mustela nivalis</i>	
Wild cat	<i>Felis silvestris</i>	

Order Chiroptera

Botta's serotine	<i>Eptesicus bottae</i>	
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	
Desert long-eared bat	<i>Otonycteris hemprichi</i>	
Eastern barbastelle	<i>Barbastella leucomelas</i>	
European free-tailed bat	<i>Tadarida teniotis</i>	Red Book Listed
Geoffroy's bat	<i>Myotis emarginatus</i>	
Geoffroy's horseshoe bat	<i>Rhinolophus clivosus</i>	
Greater horseshoe bat	<i>Rhinolophus ferrumequinum</i>	
Grey big-eared bat	<i>Plecotus austriacus</i>	
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	Red Book Listed
Lesser mouse-eared bat	<i>Myotis blythii</i>	
Noctule	<i>Nyctalus noctula</i>	
Northern bat	<i>Eptesicus nilssoni</i>	
Particoloured bat	<i>Vespertilio murinus</i>	
Savi's pipistrelle	<i>Pipistrellus savii</i>	
Serotine	<i>Eptesicus serotinus</i>	
Whiskered bat	<i>Myotis mystacinus</i>	

Order Insectivora

Bi-coloured shrew	<i>Crocidura leucodon</i>
Brandt's hedgehog	<i>Hemiechinus hypomelas</i>
Eurasian pygmy shrew	<i>Sorex minutus</i>
Eurasian shrew	<i>Sorex araneus</i>
Eurasian water shrew	<i>Neomys fodiens</i>
Lesser shrew	<i>Crocidura suaveolens</i>
Long-eared hedgehog	<i>Hemiechinus auritus</i>
Tien Shan shrew	<i>Sorex asper</i>
White-toothed pygmy shrew	<i>Suncus etruscus</i>

Order Lagomorpha

Mountain hare	<i>Lepus timidus</i>	Introduced in 1965
Royle's pika	<i>Ochotona roylei</i>	
Tolai hare	<i>Lepus tolai</i>	
Turkestan red pika	<i>Ochotona rutila</i>	

Order Rodentia

Altai vole	<i>Microtus obscurus</i>	
Brown rat	<i>Rattus norvegicus</i>	Introduced in 20 th Century

Appendix D – Mammals of the Kyrgyz Republic

Common vole	<i>Microtus arvalis</i>	
Eurasian red squirrel	<i>Sciurus vulgaris</i>	Introduced in 1950's
European rabbit	<i>Oryctolagus cuniculus</i>	Introduced
Forest dormouse	<i>Dryomys nitedula</i>	
Great jerboa	<i>Allactaga major</i>	
Grey dwarf hamster	<i>Cricetulus migratorius</i>	
Grey marmot	<i>Marmota baibacina</i>	
House mouse	<i>Mus musculus</i>	
Indian crested porcupine	<i>Hystrix indica</i>	
Juniper Vole	<i>Microtus juldaschi</i>	
Libyan jird	<i>Meriones libycus</i>	
Long-tailed field mouse	<i>Apodemus sylvaticus</i>	
Long-Tailed marmot	<i>Marmota caudata</i>	
Menzbier's marmot	<i>Marmota menzbieri</i>	Red Book Listed
Mongolian five-toed jerboa	<i>Allactaga sibirica</i>	
Muskrat	<i>Ondatra zibethicus</i>	Introduced in 1944
Narrow-headed vole	<i>Microtus gregalis</i>	
Northern three-toed jerboa	<i>Dipus sagitta</i>	
Nutria	<i>Myocastor coypus</i>	Introduced in 1954
Silver mountain vole	<i>Alticola argentatus</i>	
Small five-toed jerboa	<i>Allactaga elater</i>	
Striped field mouse	<i>Apodemus agrarius</i>	
Tamarisk jird	<i>Meriones tamariscinus</i>	
Tien Shan birch mouse	<i>Sicista tianshanica</i>	
Tien Shan ground squirrel	<i>Spermophilus relictus</i>	
Tien Shan red-backed vole	<i>Clethrionomys centralis</i>	
Tien Shan vole	<i>Microtus kirgisorum</i>	
Turkestan rat	<i>Rattus turkestanicus</i>	
Yellow ground squirrel	<i>Spermophilus fulvus</i>	
Zaisan mole vole	<i>Ellobius tancrei</i>	

Appendix E:

Birds of the Kyrgyz Republic

Birds of the Kyrgyz Republic

Source: van der Ven 2002

Index of Bird Groups

1. Partridges, Pheasants	35. Loons
2. Swans, Geese	36. Shrikes
3. Ducks	37. Crows, Jays
4. Woodpeckers	38. Oriole
5. Hoopoe	39. Paradise flycatcher
6. Roller	40. Waxwing
7. Kingfisher	41. Dippers
8. Bee-eaters	42. Thrushes
9. Cuckoos	43. Flycatchers
10. Swifts	44. Robins, Redstarts, Forktail, Chats, Wheatears
11. Owls	45. Starlings
12. Nightjars	46. Nuthatch, Wallcreeper, Treecreepers
13. Pigeons, Doves	47. Wren
14. Bustard	48. Tits
15. Cranes	49. Long-tailed tit
16. Quails, Rails, Crakes	50. Swallows, Martins
17. Sand Grouses	51. Crests
18. Woodcock, Snipes	52. Bush warblers
19. Godwits, Sandpipers, Curlews, Phalarope	53. Grass warblers
20. Thick-knee	53.1 Marsh warblers
21. Oystercatchers, Stilts	53.2 Tree warblers
22. Plovers	53.3 Scrub warblers
23. Pratincoles	54. Tit warbler
24. Gulls	55. Leaf warblers
25. Terns	56. Parrotbill
26. Osprey	57. Sylvia warblers
27. Birds of Prey	58. Larks
28. Falcons	59. Sparrows, Snowfinches
29. Grebes	60. Wagtails
30. Cormorants	61. Pipits
31. Herons, Bitterns	62. Accentors
32. Ibises	63. Finches
33. Pelicans	64. Buntings
34. Storks	

* Denotes a Red Book Listed Bird Species

Common Name

Latin Name

1. Partridges, Pheasants

Himalayan snowcock	<i>Tetraogallus himalayensis</i>
Chukar	<i>Alectoris chukar</i>
Grey partridge	<i>Perdix perdix</i>
Daurian partridge	<i>Perdix dauuricae</i>
Common pheasant	<i>Phasianus colchicus</i>
Black grouse *	<i>Tetrao tetrix</i>

2. Swans, Geese

Mute swan	<i>Cygnus olor</i>
Whooper swan *	<i>Cygnus cygnus</i>
Bean goose	<i>Anser fabalis</i>
Greater white-fronted goose	<i>Anser albifrons</i>
Greylag goose	<i>Anser anser</i>
Bar-headed goose *	<i>Anser indicus</i>

3. Ducks

Ruddy shelduck	<i>Tadorna ferruginea</i>
Common shelduck	<i>Tadorna tadorna</i>
Gadwall	<i>Anas strepera</i>
Eurasian wigeon	<i>Anas penelope</i>
Mallard	<i>Anas platyrhynchos</i>
Northern shoveler	<i>Anas clypeata</i>
Northern pintail	<i>Anas acuta</i>
Garganey	<i>Anas querquedula</i>
Baikal teal	<i>Anas formosa</i>
Common teal	<i>Anas crecca</i>
White-headed duck	<i>Oxyura leucocephala</i>
Marbled duck	<i>Marmaronetta angustirostris</i>
Red-crested pochard	<i>Rhodonessa rufina</i>
Common pochard	<i>Aythya ferina</i>
Ferruginous pochard	<i>Aythya nyroca</i>
Tufted duck	<i>Aythya fuligula</i>
Greater scaup	<i>Aythya marila</i>
Long-tailed duck	<i>Clangula hyemalis</i>
Common goldeneye	<i>Bucephala clangula</i>
Smew	<i>Mergus albellus</i>
Red-breasted merganser	<i>Mergus serrator</i>
Common merganser	<i>Mergus merganser</i>

4. Woodpeckers

Eurasian wryneck	<i>Jynx torquilla</i>
Great spotted woodpecker	<i>Dendrocopos major</i>
White-winged woodpecker	<i>Dendrocopos leucopterus</i>
Three-toed woodpecker	<i>Picoides tridactylis</i>

5. Hoopoe

Common hoopoe	<i>Upupa epops</i>
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6. Roller

European roller	<i>Coracias garrulus</i>
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7. Kingfisher

Common kingfisher	<i>Alcedo atthis</i>
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8. Bee-eaters

European bee-eater	<i>Merops apiaster</i>
Blue-cheeked bee-eater	<i>Merops superciliosus</i>

9. Cuckoos

Eurasian cuckoo	<i>Cuculus canorus</i>
Oriental cuckoo	<i>Cuculus saturatus</i>

10. Swifts

Alpine swift	<i>Tachymarptis melba</i>
Common swift	<i>Apus apus</i>

11. Owls

Pallid scops owl	<i>Otus brucei</i>
Eurasian scops owl	<i>Otus scops</i>
Eurasian eagle owl	<i>Bubo bubo</i>
Snowy owl	<i>Nyctea scandiaca</i>
Tawny owl	<i>Strix aluco</i>
Northern hawk owl	<i>Surnia ulula</i>
Little owl	<i>Athene noctua</i>
Boreal owl	<i>Aegolius funereus</i>
Long-eared owl	<i>Asio otus</i>
Short-eared owl	<i>Asio flammeus</i>

12. Nightjars

Eurasian nightjar	<i>Caprimulgus europaeus</i>
Egyptian nightjar	<i>Caprimulgus aegyptius</i>

13. Pigeons, Doves

Rock pigeon	<i>Columba livia</i>
Hill pigeon	<i>Columba rupestris</i>
Snow pigeon *	<i>Columba leuconota</i>
Stock pigeon	<i>Columba oenas</i>
Yellow-eyed pigeon	<i>Columba eversmanni</i>
Common wood pigeon	<i>Columba palumbus</i>
European turtle dove	<i>Streptopelia turtur</i>
Oriental turtle dove	<i>Streptopelia orientalis</i>
Laughing dove	<i>Streptopelia orientalis</i>
Eurasian collared dove	<i>Streptopelia decaocto</i>

14. Bustard

Little bustard	<i>Tetrax tetrax</i>
Great bustard *	<i>Otis tarda</i>
McQueen's bustard	<i>Chlamydotis macqueeni</i>

15. Cranes

Demoiselle crane *	<i>Grus virgo</i>
Common crane	<i>Grus grus</i>

16. Quails, Rails, Crakes

Common quail	<i>Coturnix coturnix</i>
Water rail	<i>Rallus aquaticus</i>
Corn crake	<i>Crex crex</i>
Little crake	<i>Porzana parva</i>
Baillon's crake	<i>Porzana pusilla</i>
Spotted crake	<i>Porzana porzana</i>
Common moorhen	<i>Gallinula chloropus</i>
Common coot	<i>Fulica atra</i>

17. Sand Grouses

Tibetan sand grouse	<i>Syrrhaptes tibetanus</i>
Pallas's sand grouse *	<i>Syrrhaptes paradoxus</i>
Black-bellied sand grouse	<i>Pterocles orientalis</i>
Pintailed sand grouse	<i>Pterocles alchata</i>

18. Woodcock, Snipes

Eurasian woodcock	<i>Scolopax rusticola</i>
Solitary snipe	<i>Gallinago solitaria</i>
Pintail snipe	<i>Gallinago stenura</i>
Common snipe	<i>Gallinago gallinago</i>
Jack snipe	<i>Lymnocryptes minimus</i>
Great snipe	<i>Gallinago media</i>

19. Godwits, Sandpipers, Curlews, Phalarope

Black-tailed godwit	<i>Limosa limosa</i>
Bar-tailed godwit	<i>Limosa lapponica</i>
Whimbrel	<i>Numenius phaeopus</i>
Slender-billed curlew	<i>Numenius tenuirostris</i>
Eurasian curlew	<i>Numenius arquata</i>
Spotted redshank	<i>Tringa erythropus</i>
Common redshank	<i>Tringa totanus</i>
Marsh sandpiper	<i>Tringa stagnatilis</i>
Common greenshank	<i>Tringa nebularia</i>
Green sandpiper	<i>Tringa ochropus</i>
Wood sandpiper	<i>Tringa glareola</i>
Terek sandpiper	<i>Xenus cinereus</i>
Common sandpiper	<i>Actitis hypoleucos</i>
Ruddy turnstone	<i>Arenaria interpres</i>
Sanderling	<i>Calidris alba</i>
Little stint	<i>Calidris minuta</i>
Temminck's stint	<i>Calidris temminckii</i>
Long-toed stint	<i>Calidris subminuta</i>
Dunlin	<i>Calidris alpina</i>
Curlew sandpiper	<i>Calidris ferruginea</i>
Broad-billed sandpiper	<i>Limicola falcinellus</i>
Ruff	<i>Philomachus pugnax</i>
Red-necked phalarope	<i>Phalaropus lobatus</i>
Red phalarope	<i>Phalaropus fulicarius</i>

20. Thick-knee

Eurasian thick-knee	<i>Burhinus oedicnemus</i>
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21. Oystercatchers, Stilts

Eurasian oystercatcher	<i>Haematopus ostralegus</i>
Ibisbill *	<i>Ibidorhyncha struthersii</i>
Black-winged stilt	<i>Himantopus himantopus</i>
Pied avocet	<i>Recurvirostra avosetta</i>

22. Plovers

Pacific golden plover	<i>Pluvialis fulva</i>
Grey plover	<i>Pluvialis squatarola</i>
Common ringed plover	<i>Charadrius hiaticula</i>
Little ringed plover	<i>Charadrius dubius</i>
Kentish plover	<i>Charadrius alexandrinus</i>
Lesser sand plover	<i>Charadrius mongolus</i>
Greater sand plover	<i>Charadrius leschenaultii</i>
Caspian plover	<i>Charadrius asiaticus</i>
Eurasian dotterel	<i>Charadrius morinellus</i>
Northern lapwing	<i>Vanellus vanellus</i>

Sociable lapwing
White-tailed Lapwing

Chettusia gregaria
Vanellochettusia leucura

23. Pratincoles

Collared pratincole
Black-winged pratincole

Glareola pratincola
Glareola nordmanni

24. Gulls

Mew gull
Herring gull
Heuelin's gull
Yellow-legged gull
Pallas's gull
Brown-headed gull
Black-headed gull
Slender-billed gull
Little gull

Larus canus
Larus argentatus
Larus heuglini
Larus cachinnans
Larus ichthyaetus
Larus brunnicephalus
Larus ridibundus
Larus genei
Larus minutus

25. Terns

Gull-billed tern
Caspian tern
Common tern
Little tern
Whiskered tern
White-winged tern
Black tern

Gelochelidon nilotica
Hydroprogne caspia
Sterna hirundo
Sterna albifrons
Chlidonias hybridus
Chlidonias leucopterus
Chlidonias niger

26. Osprey

Osprey

Pandion haliaetus

27. Birds of Prey

Eurasian honey-buzzard
Oriental honey-buzzard
Black-eared kite
Pallas's fish eagle
White-tailed eagle *
Egyptian vulture
Lammergeyer *
Himalayan griffon *
Eurasian griffon
Cinereous vulture
Short-toed snake eagle *
Eurasian marsh harrier
Hen harrier
Pallid harrier
Montagu's harrier

Pernis apivorus
Pernis ptilorhynchus
Milvus lineatus
Haliaeetus leucoryphus
Haliaeetus albicilla
Neophron percnopterus
Gypaetus barbatus
Gyps himalayensis
Gyps fulvus
Aegypius monachus
Circus gallicus
Circus aeruginosus
Circus cyaneus
Circus macrourus
Circus pygargus

Appendix E – Birds of the Kyrgyz Republic

Shikra	<i>Accipiter badius</i>
Eurasian sparrowhawk	<i>Accipiter nisus</i>
Northern goshawk	<i>Accipiter gentilis</i>
Common buzzard	<i>Buteo buteo</i>
Long-legged buzzard	<i>Buteo rufinus</i>
Upland buzzard	<i>Buteo hemilasius</i>
Rough-legged buzzard	<i>Buteo lagopus</i>
Greater spotted eagle	<i>Aquila clanga</i>
Steppe eagle *	<i>Aquila nipalensis</i>
Imperial eagle *	<i>Aquila heliaca</i>
Golden eagle *	<i>Aquila chrysaetos</i>
Bonelli's eagle	<i>Hieraaetus fasciatus</i>
Booted eagle	<i>Hieraaetus pennatus</i>

28. Falcons

Lesser kestrel	<i>Falco naumanni</i>
Common kestrel	<i>Falco tinnunculus</i>
Red-footed falcon	<i>Falco vespertinus</i>
Merlin	<i>Falco columbarius</i>
Eurasian hobby	<i>Falco subbuteo</i>
Saker falcon *	<i>Falco cherrug</i>
Gyr falcon	<i>Falco rusticolus</i>
Peregrine falcon	<i>Falco peregrinus</i>
Barbary falcon *	<i>Falco pelegrinoides</i>
Laggar falcon	<i>Falco jugger</i>

29. Grebes

Little grebe	<i>Tachybaptus ruficollis</i>
Red-necked grebe	<i>Podiceps grisegena</i>
Great crested grebe	<i>Podiceps cristatus</i>
Horned grebe	<i>Podiceps auritus</i>
Black-necked grebe	<i>Podiceps nigricollis</i>

30. Cormorants

Pygmy cormorant	<i>Phalacrocorax pygmaeus</i>
Great cormorant	<i>Phalacrocorax carbo</i>

31. Herons, Bitterns

Grey heron	<i>Ardea cinerea</i>
Purple heron	<i>Ardea purpurea</i>
Great egret	<i>Casmerodius albus</i>
Little egret	<i>Egretta garzetta</i>
Black-crowned night heron	<i>Nycticorax nycticorax</i>
Little bittern	<i>Ixobrychus minutus</i>
Great bittern	<i>Botaurus stellaris</i>

32. Ibises

Glossy ibis
Eurasian spoonbill

Plegadis falcinellus
Platalea leucorodia

33. Pelicans

Great white pelican
Dalmatian pelican

Pelecanus onocrotalus
Pelecanus crispus

34. Storks

Black stork *
White stork *

Ciconia nigra
Ciconia ciconia

35. Loons

Black-throated loon

Gavia arctica

36. Shrikes

Red-backed shrike
Rufous-tailed shrike
Brown shrike
Long-tailed shrike
Lesser grey shrike
Great grey shrike

Lanius collurio
Lanius isabellinus
Lanius cristatus
Lanius schach
Lanius minor
Lanius excubitor

37. Crows, Jays

Black-billed magpie
Spotted nutcracker
Red-billed chough
Yellow-billed chough
Eurasian jackdaw
Rook
Carrion crow
Common raven
Brown-necked raven

Pica pica
Nucifraga caryocatactes
Pyrrhocorax pyrrhocorax
Pyrrhocorax graculus
Corvus monedula
Corvus frugilegus
Corvus corone
Corvus corax
Corvus ruficollis

38. Oriole

Eurasian golden oriole

Oriolus oriolus

39. Paradise Flycatcher

Asian paradise-flycatcher *

Terpsiphone paradisi

40. Waxwing

Bohemian waxwing

Bombycilla garrulus

41. Dippers

White-throated dipper	<i>Cinclus cinclus</i>
Brown dipper	<i>Cinclus pallasii</i>

42. Thrushes

Rufous-tailed rock thrush	<i>Monticola saxatilis</i>
Blue rock thrush	<i>Monticola solitarius</i>
Blue whistling thrush	<i>Myophonus caeruleus</i>
Eurasian blackbird	<i>Turdus merula</i>
Mistle thrush	<i>Turdus viscivorus</i>
Dark-throated thrush	<i>Turdus ruficollis</i>
Fieldfare	<i>Turdus pilaris</i>
Redwing	<i>Turdus iliacus</i>
Song thrush	<i>Turdus philomelos</i>

43. Flycatchers

Spotted flycatcher	<i>Muscicapa striata</i>
Rufous-tailed flycatcher	<i>Muscicapa ruficauda</i>
Red-throated flycatcher	<i>Ficedula parva</i>

44. Robins, Redstarts, Forktail, Chats, Wheatears

Eurasian robin	<i>Erithacus rubecula</i>
Common nightingale	<i>Luscinia megarhynchos</i>
Thrush nightingale	<i>Luscinia luscinia</i>
White-tailed rubythroat	<i>Luscinia pectoralis</i>
Bluethroat	<i>Luscinia svecica</i>
White-throated robin	<i>Irania gutturalis</i>
Rufous-backed redstart	<i>Phoenicurus erythronota</i>
Blue-capped redstart	<i>Phoenicurus coeruleocephalus</i>
Black redstart	<i>Phoenicurus ochruros</i>
Common redstart	<i>Phoenicurus phoenicurus</i>
White-winged redstart	<i>Phoenicurus erythrogaster</i>
White-capped water redstart	<i>Chaimarron leucocephala</i>
Plumbeous water redstart	<i>Rhyacornis fuliginosus</i>
Little forktail	<i>Enicurus scouleri</i>
Rufous scrub/Bush robin	<i>Erythropygia/Cercotrichas galactotes</i>
Common stonechat	<i>Saxicola torquata</i>
Pied bushchat	<i>Saxicola caprata</i>
Northern wheatear	<i>Oenanthe oenanthe</i>
Variable wheatear	<i>Oenanthe picata</i>
Pied wheatear	<i>Oenanthe pleschanka</i>
Desert wheatear	<i>Oenanthe deserti</i>
Isabelline wheatear	<i>Oenanthe isabellina</i>

45. Starlings

Rosy starling	<i>Sturnus roseus</i>
Common starling	<i>Sturnus vulgaris</i>
Common myna	<i>Acridotheres tristis</i>

46. Nuthatch, Wallcreeper, Treecreepers

Greater rock nuthatch	<i>Sitta tephronota</i>
Wallcreeper	<i>Tichodroma muraria</i>
Eurasian treecreeper	<i>Certhia familiaris</i>
Bar-tailed treecreeper	<i>Certhia himalayana</i>

47. Wren

Winter wren	<i>Troglodytes troglodytes</i>
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48. Tits

White-crowned penduline tit	<i>Remiz coronatus</i>
Willow tit	<i>Parus montanus</i>
Rufous-naped tit	<i>Parus rufonuchalis</i>
Coal tit	<i>Parus ater</i>
Great tit	<i>Parus major</i>
Turkestan tit	<i>Parus bokharensis</i>
Azure tit	<i>Parus cyanus</i>
Yellow-breasted tit	<i>Parus flavipectus</i>

49. Long-tailed Tit

Long-tailed tit	<i>Aegithalos caudatus</i>
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50. Swallows, Martins

Sand martin	<i>Riparia riparia</i>
Pale martin	<i>Riparia diluta</i>
Eurasian crag martin	<i>Hirundo rupestris</i>
Barn swallow	<i>Hirundo rustica</i>
Red-rumped swallow	<i>Hirundo daurica</i>
Northern house martin	<i>Delichon urbica</i>

51. Crests

Goldcrest	<i>Regulus regulus</i>
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52. Bush Warblers

Cetti's bush warbler	<i>Cettia cetti</i>
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53. Grass Warblers

Grasshopper warbler	<i>Locustella naevia</i>
Rusty-rumped warbler	<i>Locustella certhiola</i>
Savi's warbler	<i>Locustella luscinioides</i>

53.1 Marsh Warblers

Moustached warbler	<i>Acrocephalus melanopogon</i>
Sedge warbler	<i>Acrocephalus schoenobaenus</i>
Paddyfield warbler	<i>Acrocephalus agricola</i>
Eurasian reed warbler	<i>Acrocephalus scirpaceus</i>
Blyth's reed warbler	<i>Acrocephalus dumetorum</i>
Great reed warbler	<i>Acrocephalus arundinaceus</i>
Clamorous reed warbler	<i>Acrocephalus stentoreus</i>

53.2 Tree Warblers

Booted warbler	<i>Hippolais caligata</i>
Upcher's warbler	<i>Hippolais languida</i>
Olivaceous warbler	<i>Hippolais pallida</i>

53.3 Scrub Warblers

Scrub warbler	<i>Scotocerca inquieta</i>
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54. Tit Warbler

White-browed tit warbler	<i>Leptopoecile sophiae</i>
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55. Leaf Warblers

Willow warbler	<i>Phylloscopus trochilus</i>
Common chiffchaff	<i>Phylloscopus collybita</i>
Mountain chiffchaff	<i>Phylloscopus sindianus</i>
Wood warbler	<i>Phylloscopus sibilatrix</i>
Sulphur-bellied warbler	<i>Phylloscopus griseolus</i>
Pallas's leaf warbler	<i>Phylloscopus proregulus</i>
Yellow-browed warbler	<i>Phylloscopus inornatus</i>
Brook's leaf warbler	<i>Phylloscopus subviridis</i>
Hume's warbler	<i>Phylloscopus humei</i>
Greenish warbler	<i>Phylloscopus trochiloides</i>
Western crowned warbler	<i>Phylloscopus occipitalis</i>
Plain leaf warbler	<i>Phylloscopus neglectus</i>

56. Parrotbill

Bearded parrotbill	<i>Panurus biarmicus</i>
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57. Sylvia Warblers

Greater whitethroat	<i>Sylvia communis</i>
Lesser whitethroat	<i>Sylvia curruca</i>
Desert warbler	<i>Sylvia nana</i>
Orphean warbler	<i>Sylvia hortensis</i>
Garden warbler	<i>Sylvia borin</i>
Blackcap	<i>Sylvia atricapilla</i>

Barred warbler
Menetries's warbler

Sylvia nisoria
Sylvia mystacea

58. Larks

Bimaculated lark
White-winged lark
Calandra lark
Black lark
Greater short-toed lark
Hume's short-toed lark
Asian short-toed lark
Crested lark
Eurasian skylark
Oriental skylark
Horned skylark

Melanocorypha bimaculata
Melanocorypha leucoptera
Melanocorypha calandra
Melanocorypha yeltoniensis
Calandrella brachydactyla
Calandrella acutirostris
Calandrella cheleensis
Galerida cristata
Alauda arvensis
Alauda gulgula
Eremophila alpestris

59. Sparrows, Snowfinches

Saxaul sparrow
House sparrow
Indian sparrow
Spanish sparrow
Eurasian tree sparrow
Rock sparrow
White-winged snowfinch

Passer ammodendri
Passer domesticus
Passer indicus
Passer hispaniolensis
Passer montanus
Petronia petronia
Montifringilla nivalis

60. Wagtails

White wagtail
Citrine wagtail
Yellow wagtail
Grey wagtail

Motacilla alba
Motacilla citreola
Motacilla flava
Motacilla cinerea

61. Pipits

Richard's pipit
Tawny pipit
Tree pipit
Meadow pipit
Water pipit

Anthus richardi
Anthus campestris
Anthus trivialis
Anthus pratensis
Anthus spinoletta

62. Accentors

Alpine accentor
Altai accentor
Brown accentor
Black-throated accentor

Prunella collaris
Prunella himalayana
Prunella fulvescens
Prunella atrogularis

63. Finches

Chaffinch	<i>Fringilla coelebs</i>
Brambling	<i>Fringilla montifringilla</i>
Fire-fronted serin	<i>Serinus pusillus</i>
Greenfinch	<i>Chloris chloris</i>
Eurasian siskin	<i>Spinus spinus</i>
European goldfinch	<i>Carduelis carduelis</i>
Common redpoll	<i>Carduelis flammea</i>
Twite	<i>Carduelis flavirostris</i>
Eurasian linnet	<i>Carduelis cannabina</i>
Plain mountain finch	<i>Leucosticte nemoricola</i>
Brandt's mountain finch	<i>Leucosticte brandti</i>
Crimson-winged finch	<i>Rhodopechys sanguinea</i>
Mongolian finch	<i>Bucanetes mongolicus</i>
Desert finch	<i>Rhodospiza obsoleta</i>
Long-tailed rosefinch	<i>Uragus sibiricus</i>
Common rosefinch	<i>Carpodacus erythrurus</i>
Red-mantled rosefinch	<i>Carpodacus rhodochlamys</i>
Great rosefinch	<i>Carpodacus rubicilla</i>
Red-faced rosefinch	<i>Carpodacus puniceus</i>
Red crossbill	<i>Loxia curvirostra</i>
Eurasian bullfinch	<i>Pyrrhula pyrrhula</i>
Hawfinch	<i>Coccothraustes coccothraustes</i>
White-winged grosbeak	<i>Mycerobas camipes</i>

64. Buntings

Yellowhammer	<i>Emberiza citrinella</i>
Pine bunting	<i>Emberiza leucocephalos</i>
White-capped bunting	<i>Emberiza stewarti</i>
Rock bunting	<i>Emberiza cia</i>
Godlewski's bunting	<i>Emberiza godlewskii</i>
Meadow bunting	<i>Emberiza cioides</i>
Grey-necked bunting	<i>Emberiza buchanani</i>
Ortolan bunting	<i>Emberiza hortulana</i>
Little bunting	<i>Emberiza pusilla</i>
Rustic bunting	<i>Emberiza rustica</i>
Yellow-breasted bunting	<i>Emberiza aureola</i>
Red-headed bunting	<i>Emberiza bruniceps</i>
Reed bunting	<i>Emberiza schoeniclus</i>
Corn bunting	<i>Miliaria calandra</i>
Snow bunting	<i>Plectrophenax nivalis</i>

Appendix F:

Fish of the Kyrgyz Republic

Fish of the Kyrgyz Republic

Source: Konurbaev 2003

Index of Fish Groups

Acipenseridae	Sturgeons
Channidae	Snakeheads
Cobitidae	Loaches
Cottidae	Bullheads
Cyprinidae	Carps
Cyprinodontiformes	Toothcarps
Eleotridae	Sleepers
Esociformes	Pikes
Gasterosteiformes	Sticklebacks
Perciformes	Perches
Salmoniformes	Salmonids
Siluriformes	Catfishes

Common Name	Latin Name	Notes
Acipenseridae Siberian sturgeon	<i>Acipenser baeri</i>	Failed Introduction
Channidae Snakehead	<i>Channa argus</i>	Introduced
Cobitidae Amu Darya stone loach Bukhara stone loach Golden spined loach Grey loach Kushakewitsch loach Spotted thicklip loach Talas stone loach Ters stone loach Tibetan stone loach	<i>Noemacheilus oxianus</i> <i>Noemacheilus amudarjensis</i> <i>Sabanejewia aurata</i> <i>Noemacheilus dorsalis</i> <i>Noemacheilus kuschakewitschi</i> <i>Noemacheilus strauchi</i> <i>Noemacheilus paradoxus</i> <i>Noemacheilus conipterus</i> <i>Noemacheilus stoliczkai</i>	
Cottidae Chatkal sculpin Turkestan sculpin	<i>Cottus jaxartensis</i> <i>Cottus spinolosus</i>	

Cyprinidae

Aral asp	<i>Aspius aspius ibliodes</i>	
Aral barbel	<i>Barbus brachycephalus</i>	
Balkhash minnow	<i>Phoxinus phoxinus poljakowi</i>	
Bream	<i>Abramis brama</i>	Introduced
Bulatmai barbel	<i>Barbus capito</i>	Extinct in Kyrgyzstan
Carp	<i>Cyprinus carpio</i>	
Common marinka	<i>Schizothorax intermedius intermedius</i>	
Dace	<i>Leuciscus leuciscus</i>	
False harlequin	<i>Pseudorasbora parva</i>	Introduced
Goldfish	<i>Carassius auratus</i>	Introduced
Grass carp	<i>Ctenopharyngodon idella</i>	Introduced
Issyk-Kul dace	<i>Leuciscus bergi</i>	
Issyk-Kul gudgeon	<i>Gobio gobio latus</i>	
Issyk-Kul marinka	<i>Schizothorax intermedius argentatus</i>	
Naked osman	<i>Diptychus dybowskii</i>	
Orfe	<i>Leuciscus idus</i>	
Pike asp	<i>Aspiolucius esocinus</i>	
Roach	<i>Rutilus rutilus</i>	
Rudd	<i>Scardinius erythrophthalmus</i>	
Scaled osman	<i>Diptychus maculatus</i>	
Schmidt's dace	<i>Leuciscus schmidtii</i>	
Sharpbelly	<i>Hemiculter leucisculus</i>	Introduced
Sharpray	<i>Capoetobrama kushakewitschi</i>	Introduced
Short-tailed minnow	<i>Phoxinus phoxinus brachiurus</i>	
Silver carp	<i>Hypophthalmichthys molitrix</i>	Introduced
Striped bystranka	<i>Alburnoides taeniatus</i>	
Syr-Darya dace	<i>Leuciscus squaliusculus</i>	
Talas dace	<i>Leuciscus lindbergi</i>	
Tench	<i>Tinca tinca</i>	Introduced
Turkestan gudgeon	<i>Gobio gobio lepidolaemus</i>	

Cyprinodontiformes

Mosquitofish	<i>Gambusia affinis</i>	Introduced
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Eleotridae

Odontobutid	<i>Micropercops cinctus</i>	Introduced
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Esociformes

Pike	<i>Esox lucius</i>	
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Appendix F – Fish of the Kyrgyz Republic

Gasterosteiformes

Ukrainian nine-spined
stickleback

Pungitius platygaster

Perciformes

Balkhash perch

Perca schrenkii

Introduced

River perch

Perca fluviatilis

Zander

Stizostedion lucioperca

Introduced

Salmoniformes

Baikal omul

Coregonus autumnalis

Failed Introduction

Brown trout

Salmo trutta

Common whitefish

Coregonus lavaretus

Introduced

Peled

Coregonus peled

Introduced

Rainbow trout

Oncorhynchus mykiss

Introduced

Sevan trout

Salmo ischchan

Introduced

Siluriformes

Turkestan catfish

Glyptosternum reticulatum

Wels

Silurus glanis

Appendix G:

Reptiles of the Kyrgyz Republic

Reptiles of the Kyrgyz Republic

Source: Uetz 2005

Index of Reptile Groups

Lizards
Snakes
Tortoises

Common Name

Latin Name

Lizards

-	<i>Phrynocephalus strauchi</i>
-	<i>Asymblepharus alaicus</i>
- gecko	<i>Cyrtopodion fedtschenkoi</i>
- racerunner	<i>Eremias nikolskii</i>
Asian snake-eyed skink	<i>Ablepharus pannonicus</i>
Badakhshana rock agama	<i>Laudakia badakhshana</i>
Desert lidless skink	<i>Ablepharus deserti</i>
Desert monitor	<i>Varanus griseus</i>
Scheltopusik (German)	<i>Pseudopus apodus</i>
Transkaspischer	<i>Cyrtopodion russowii</i>
Nacktfingergecko (German)	
Gobi racerunner	<i>Eremias przewalskii</i>
Himalayan agama	<i>Laudakia himalayana</i>
Kashgar racerunner	<i>Eremias buechneri</i>
Kirghizia even-fingered gecko	<i>Alsophylax tokobajevi</i>
Minor snake-eyed skink	<i>Ablepharus grayanus</i>
Multi-ocellated racerunner	<i>Eremias multiocellata</i>
Rapid racerunner	<i>Eremias velox</i>
Secret toadhead agama	<i>Phrynocephalus mystaceus</i>
Steppe racerunner	<i>Eremias arguta</i>
Steppe agama	<i>Trapelus sanguinolentus</i>
Sunwatcher toadhead agama	<i>Phrynocephalus helioscopus</i>
Turkestan rock agama	<i>Laudakia lehmanni</i>

Snakes

Asian racer

Coluber nummifer

Central Asian cobra

Naja oxiana

Diadem snake

Spalerosophis diadema

Dice snake

Natrix tessellate

Halys pit viper

Gloydius halys

Meadow viper

Vipera ursinii

Spotted desert racer

Coluber karelini

Steppe ratsnake

Elaphe dione

Steppe ribbon racer

Psammophis lineolatus

Tartar sand boa

Eryx tataricus

Tortoise

Horsfield's tortoise

Testudo horsfieldii

Appendix H:

Amphibians of the Kyrgyz Republic

Amphibians of the Kyrgyz Republic

Source: Frost 2004



Common Name

Tian Shan toad
Green toad
Central Asian frog
Marsh frog
Turkestan Salamander

Latin Name

Bufo pewzowi/*Bufo tianschanica* (synonym)
Bufo viridis
Rana asiatica
Rana ridibunda
Hynobius turkestanicus

Appendix I:

Trees and Shrubs of the Kyrgyz Republic

Trees and Shrubs of the Kyrgyz Republic

Source: Compiled from MEP 1998, Daviesson 2001, Mambetaliev 2003a, Mambetaliev 2003b, Kendirbaeva 2002a, 2002b.

Index of Trees and Shrubs

Coniferous Trees and Shrubs
Deciduous Trees and Shrubs
Wild Fruit and Nut Trees
Introduced Trees

Common Name

Latin Name

Coniferous Trees and Shrubs

Semenov's fir	<i>Abies semenovii</i>
Savin juniper	<i>Juniperus sabina</i>
Half-globe juniper	<i>Juniperus semiglobosa</i>
Zeravshan juniper	<i>Juniperus seravschanica</i>
Turkestan juniper	<i>Juniperus turkestanica</i>
Schrenk's spruce	<i>Picea schrenkiana</i>

Deciduous Trees and Shrubs

Semenov's maple	<i>Acer semenovii</i>
Turkestan maple	<i>Acer Turkestanicum</i>
Weeping birch	<i>Betula pendula</i>
Curved birch	<i>Betula procurva</i>
Tian Shan birch	<i>Betula tianschanica</i>
-	<i>Calophaca tianshanica</i>
Kyrgyz peashrub	<i>Caragana kirgisorum</i>
Turkestan peashrub	<i>Caragana turkestanica</i>
Caucasian hackberry	<i>Celtis caucasia</i>
Black-berried cotoneaster	<i>Cotoneaster melanocarpa</i>
Multiflora cotoneaster	<i>Cotoneaster multiflorus</i>
- cotoneaster	<i>Cotoneaster melanocarpus</i>
- cotoneaster	<i>Cotoneaster oliganthus</i>
Koopman's spindle tree	<i>Euonymus koopmannii</i>
Semenov's spindle tree	<i>Euonymus semenovii</i>
Tian Shan pearlbush	<i>Exochorda tianshanica</i>
Sogdian ash	<i>Fraxinus sogdiana</i>
- honeysuckle	<i>Hedysarum chaitocarpum</i>
Fergana honeysuckle	<i>Hedysarum feganense</i>

Santalash honeysuckle	<i>Hedysarum santalaschi</i>
Semenov's honeysuckle	<i>Hedysarum semenovii</i>
Turkestan honeysuckle	<i>Hedysarum turkestanicum</i>
Sea buckthorn	<i>Hippophae rhamnoides</i>
Uneven stiff-haired honeysuckle	<i>Lonicera anisotricha</i>
Karelin's honeysuckle	<i>Lonicera karelinii</i>
Korolkov's honeysuckle	<i>Lonicera korolkovii</i>
- honeysuckle	<i>Lonicera microphylla</i>
Coin-leaved honeysuckle	<i>Lonicera nummulariifolia</i>
Olga's honeysuckle	<i>Lonicera olgae</i>
Fern-flower honeysuckle	<i>Lonicera stenantha</i>
Tatar honeysuckle	<i>Lonicera tatarica</i>
Talas poplar	<i>Populus talassica</i>
White poplar	<i>Populus alba</i>
Black poplar	<i>Populus nigra</i>
Common buckthorn	<i>Rhamnus cathartica</i>
Albert's rose	<i>Rosa albertii</i>
Begger's rose	<i>Rosa beggeriana</i>
Dog rose	<i>Rosa canina</i>
Fedchenko's rose	<i>Rosa fedtschenkoana</i>
Kokhand rose	<i>Rosa kokanica</i>
- rose	<i>Rosa laxa</i>
Samarkand rose	<i>Rosa maracandica</i>
- rose	<i>Rosa nanothamnus</i>
- rose	<i>Rosa platyacantha</i>
Alatav willow	<i>Salix alatavica</i>
Ilij willow	<i>Salix iliensis</i>
Niedzwieki willow	<i>Salix niedzwieckii</i>
Turan willow	<i>Salix turanica</i>
Tian Shan willow	<i>Salix tianschanica</i>
Wilhelm's willow	<i>Salix wilhelmsiana</i>
Persian mountain ash	<i>Sorbus persica</i>
Tian Shan mountain ash	<i>Sorbus tianschanica</i>
Turkestan mountain ash	<i>Sorbus turkestanica</i>
Hyperleaved spirea	<i>Spiraea hypericifolia</i>
- spirea	<i>Spiraea pilosa</i>
Thin tamarisk	<i>Tamarix leptostachys</i>

Wild Fruit and Nut Trees

Common almond	<i>Amygdalus communis</i>
Petunikovz almond	<i>Amygdalus petunnikovi</i>
Common apricot	<i>Armenica vulgaris</i>
Coin-like barberry	<i>Berberis nummularia</i>
Oblong barberry	<i>Berberis oblonga</i>
- barberry	<i>Berberis sphaerocarpa</i>
- cherry	<i>Cerasus erythrocarpa</i>

Appendix I – Trees and Shrubs of the Kyrgyz Republic

Mahaleb cherry	<i>Cerasus mahaleb</i>
Tian Shan cherry	<i>Cerasus tianschanica</i>
- cherry	<i>Cerasus verrucosa</i>
Knorring hawthorn	<i>Crataegus knorringiana</i>
Pontiac hawthorn	<i>Crataegus pontica</i>
Jungar hawthorn	<i>Crataegus songorica</i>
Turkestan hawthorn	<i>Crataegus turkestanica</i>
Fig tree	<i>Ficus carica</i>
Walnut	<i>Juglans regia</i>
Siever's apple	<i>Malus sieversii</i>
Kyrgyz apple	<i>Malus kirghisorum</i>
Nedzvedsky's apple	<i>Malus niedzwetzkyana</i>
Pistachio	<i>Pistacia vera</i>
Sogdian wild prune	<i>Prunus sogdiana</i>
- myrobalan	<i>Prunus divaricata</i>
Common pear	<i>Pyrus communis</i>
Central Asian Pear	<i>Pyrus issuriensis</i>
Korzhinski pear	<i>Pyrus korshinskyi</i>
Regel pear	<i>Pyrus regelii</i>
Janchevsky's currant	<i>Ribes janczewski</i>
Meyer's currant	<i>Ribes meyeri</i>
Uzunakmat grapevine	<i>Vitis usunachmatica</i>
Wild grapevine	<i>Vitis vinifera</i>
Common jujube	<i>Zizyphus jujube</i>
Wild pomegranate	<i>Punica granatum</i>

Introduced Tree Species

Birch	<i>Betula spp.</i>
Larch	<i>Larix sibirica</i>
Spruce	<i>Picea spp.</i>
Pine	<i>Pinus spp.</i>
Scotch pine	<i>Pinus sylvestris</i>
Crimean pine	<i>Pinus nigra pallasiana</i>
Siberian pine	<i>Pinus sibirica</i>

Appendix J:

Wildflowers of the Kyrgyz Republic

Wildflowers of the Kyrgyz Republic

Source: MEP 1998

Allium aflatunense
Allium altissimum
Allium atosanguineum
Allium barszczewskii
Allium coeruleum
Allium karataviense
Allium polyphyllum
Allium renardii
Allium semenovii
Allium stipitatum
Anemone protracta
Aquilegia vicaria
Aquilegia karelini
Arum korolkowii
Colchicum kesselringii
Colchicum luteum
Crocus alatavicus
Crocus korolkowii
Eminium regelii
Eremurus cristatus
Eremurus kaufmannii
Eremurus luteus
Eremurus olgae
Eremurus regelii
Eremurus robustus
Eremurus tianschanicus
Erianthus ravennae
Erigeron aurantiacus
Fritillaria walujewii
Hennigia lactiflora
Incarvillea olgae
Irididictyum kolpakowskianum
Iris albertii
Iris brevituba
Iris loszyi
Iris oxypetala
Iris sogdiana
Ixiolirion tataricum
Juno kuschakewiczii
Juno orchoides

Korolkovia sewerzowii
Leontopodium spp.
Linum heterocephalum
Paeonia intermedia
Polygonum cariarum
Primula lactiflora
Primula macrocalyx
Primula kaufmaniana
Primula longiscapa
Primula turkestanica
Pyrethrum partheniifolium
Scilla puschkinoides
Trollius altaicus
Trollius dschungaricus
Tulipa affinis
Tulipa anadroma
Tulipa bifloriformis
Tulipa dasystemon
Tulipa dubia
Tulipa ferganica
Tulipa greigii
Tulipa heterophilla
Tulipa kaufmanniana
Tulipa kolpakowskiana
Tulipa neustrueviae
Tulipa nitida
Tulipa platystemon
Tulipa ostrowskiana
Tulipa rosea
Tulipa tarda
Tulipa tetraphylla
Tulipa tianschanica
Tulipa turkestanica
Tulipa zenaidae
Verbascum songoricum

Appendix K:

Medicinal Plants of the Kyrgyz Republic

Medicinal Plants of the Kyrgyz Republic

Source: MEP 1998

Achillea millefolium
Aconitum songoricum
Artemisia absinthium
Betonica foliosa
Capsella bursa pastoris
Chelidonium majus
Convolvulus subhirsutus
Datura stramonium
Delphinium confusum
Descurania sophiae
Dryopteris filixmas
Ephedra equisetina
Equisetum arvense
Glycyrrhiza glabra
Goebelia pachycarpa
Helichrisum arenarium
Hippophae rhamnoides
Hyoscyamus niger
Hypericum perforatum
Inula helanum
Juglans regia
Juniperus semiglobosa
Matricaria chamomilla
Ononis antiquorum
Origanum vulgare
Padus racemosa
Paeonia anomalia
Peganum garmala
Plantago major
Poligonum aviculare
Poligonum hydropiper
Poligonum persiaria
Populus nigra
Ranunculus acer
Rhamnus cathartica
Rosa spp.
Sphaerophysa salsula
Thermopsis lanceolata
Traxacum officinale
Tussilago farfara
Urtica dioica
Veratrum lobelianum

Appendix L:

Edible Mushrooms of the Kyrgyz Republic

Edible Mushrooms of the Kyrgyz Republic

Source: MEP 1998

Agaricus bisporus

Agaricus campestris

Boletus erythropus

Lepista saeva

Pleurotus eryngii

Russula delica

Suillus grevillei

Zactarius deliciosus

Zactarius pubescens

Zactarius torminosus

Appendix M:

Endemic Plants of the Kyrgyz Republic

Endemic Plants of the Kyrgyz Republic

Source: MEP 1998

Index of Plant Families

Latin Name	Common Name
Family Amaryllidaceae	Amaryllis Family
Family Apiaceae	Parsley Family
Family Araceae	Aroid Family
Family Asteraceae	Aster/Sunflower Family
Family Berberidaceae	Barberry Family
Family Bignoniaceae	Bignonia Family
Family Boraginaceae	Borage Family
Family Brassicaceae	Mustard Family
Family Campanulaceae	Bellflower Family
Family Caryophyllaceae	Pink Family
Family Chenopodiaceae	Goosefoot Family
Family Convolvulaceae	Morning Glory Family
Family Crassulaceae	Orpine Family
Family Cyperaceae	Sedge Family
Family Euphorbiaceae	Spurge Family
Family Fabaceae	Pea/Legume Family
Family Iridaceae	Iris family
Family Lamiaceae	Mint Family
Family Liliaceae	Lily Family
Family Limoniaceae	Leadwort Family
Family Papaveraceae	Poppy family
Family Pinaceae	Pine Family
Family Poaceae	Grass Family
Family Polygonaceae	Buckwheat Family
Family Primulaceae	Primrose Family
Family Ranunculaceae	Buttercup Family
Family Rosaceae	Rose Family
Family Rutaceae	Rue Family
Family Santalaceae	Sandalwood Family
Family Saxifragaceae	Saxifrage Family
Family Scrophulariaceae	Figwort/Snapdragon Family
Family Solanaceae	Nightshade/Potato Family
Family Thymelaeaceae	Mezereum Family

Family: Amaryllidaceae

Ixiolirion ferganicum Kovalevsk. et Vved.

Ungernia ferganica Vved. ex Artjushenko

Family: Apiaceae

Aulacospermum tenuisectum Korov.

Bupleurum ferganense Lincz.

Bupleurum gulczense O. et B. Fedtsch.

Bupleurum rosulare Korov. ex M. Pimen. et Sdobnina

Dorema microcarpum Korov.

Elaeosticta ferganensis (Lipsky) Kljuykov, M. Pimen. et V. Tichomirov

Elaeosticta knorringiana (Korov.) Korov.

Ferula aitchisonii K.-Pol.

Ferula angustiloba M.Pimen.

Ferula czatkalensis M.Pimen.

Ferula fedoroviorum M.Pimen.

Ferula korshinskyi Korov.

Ferula lipskyi Korov.

Ferula minkwitzae Korov.

Ferula rubroarenosa Korov.

Ferula subtilis Korov.

Ferula vicaria Korov.

Hyalolaena intermedia M. Pimen. et Kljuykov

Mogoltavia narynensis M.Pimen. et Kljuykov

Mogoltavia sewerzowii (Regel) Korov. SE

Pastinacopsis glacialis Golosk. SE

Prangos gyrocarpa Kuzmina

Prangos lipskyi Korov.

Schrenkia pulverulenta M.Pimen.

Seseli depauperatum (Schischk.) V. Vinogradova

Seseli eryngioides (Korov.) M.Pimen. et V.Tichomirov

Seseli fasciculatum (Korov.) Korov. ex Schischk.

Seseli giganteum Lipsky

Seseli korshinskyi (Schischk.) M.Pimen.

Seseli luteolum M.Pimen.

Seseli tenellum M.Pimen.

Seseli unicaule (Korov.) M.Pimen.

Seseli valentinae M.Pop.

Family: Araceae

Eminium regeli Vved. Subendemic(SE)

Family: Asteraceae

Ajania abolinii Kovalevsk.

Ajania korovinii Kovalevsk.

Appendix M – Endemic Plants of the Kyrgyz Republic

Artemisia knorringiana Krasch.
Artemisia nigricans Filat. et Ladygina
Artemisia saposchnikovii Krasch. ex Poljak.
Aster tolmatschevii Tamamsch.
Asterothamnus schischkinii Tamamsch.
Brachanthemum kirgisorum Krasch.
Cancrinia tianschanica (Krasch.) Tzvel.
Centaurea alaica Iljin
Chondrilla ornata Iljin
Cousinia abolinii Kult. ex Tscherneva
Cousinia caespitosa C.Winkl.
Cousinia carduncelloidea Regel et Schmalh.
Cousinia gulczensis Kult.
Cousinia jassyensis C.Winkl.
Cousinia knorringiae Bornm.
Cousinia korshinskyi C.Winkl.
Cousinia laniceps Juz.
Cousinia margaritae Kult.
Cousinia omphalodes Tscherneva
Cousinia pentacantha Regel et Schmalh.
Cousinia schischkinii Juz.
Cousinia stellaris Bornm.
Cousinia subappendiculata Kult.
Cousinia tamarae Juz.
Cousinia waldheimiana Bornm.
Echinops fastigiatus R.Kam. et Tscherneva
Hypacanthium echinopifolium (Bornm.) Juz.
Jurinea abolinii Iljin
Jurinea androssovii Iljin
Jurinea caespitans Iljin
Jurinea densisquamea Iljin
Jurinea grumosa Iljin
Jurinea macranthodia Iljin
Jurinea nivea C.Winkl.
Jurinea poacea Iljin
Jurinea schachimardanica Iljin
Jurinea stenophylla Iljin
Jurinea trifurcata Iljin
Kovalevskiella kovalevskiana (Kirp.) R.Kam.
Lactuca alaica Kovalevsk.
Lamyropappus schakaptaricus (B.Fedtsch.) Knorr. et Tamamsch.
Lepidolopha komarowii C. Winkl. SE
Olgaea longifolia (C.Winkl.) Iljin
Olgaea spinifera Iljin
Olgaea vvedenskyi Iljin
Pseudoglossanthus aulieatensis (B. Fedtsch.) Poljak.

Pseudolinosyris microcephala (Novopokr.) Tamamsch.
Pyrethrum brachanthemoides R.Kam. et Lazkov
Pyrethrum kovalevskiae Ikonn.
Pyrethrum leontopodium (C. Winkl.) Tzvel.
Pyrethrum mikeschinskii Tzvel.
Pyrethrum sovetkinae Kovalevsk.
Rhaponticum aulieatense Iljin
Rhaponticum lyratum C.Winkl. ex Iljin
Rhaponticum namanganicum Iljin
Saussurea alberti Regel et C.Winkl.
Saussurea involucrata (Kar. et Kir.) Sch. Bip.
Saussurea karaartscha Saposhn.
Saussurea schachimardanica R.Kam.
Serratula aphyllipoda Iljin
Sonchus longifolius (C. Winkl.) R.Kam.
Tanacetopsis ferganensis (Kovalevsk.) Kovalevsk.
Tanacetopsis korovinii Kovalevsk.
Tanacetopsis setacea (Regel et Schmalh.) Kovalevsk.
Taraxacum alaicum Schischk.
Taraxacum alpigenum Dshanaeva
Taraxacum heptapotamicum Schischk.
Taraxacum oschense Schischk.
Taraxacum paradoxos (C. Winkl.) Tzvel.
Taraxacum promontorium Dshanaeva
Taraxacum syrtorum Dshanaeva
Trichanthemis aurea Krasch.
Ugamia angrenica (Krasch.) Tzvel. SE

Family: Berberidaceae

Berberis kaschgarica Rupr. SE

Family: Bignoniaceae

Asperula botschantzevii Pachom.
Incarvillea olgae Regel SE
Lonicera anisotricha Bondar.
Lonicera paradoxa Pojark.

Family: Boraginaceae

Arnebia paucisetosa A. Li
Lappula physacantha Golosk.
Lappula ulacholica M.Pop.
Lepechiniella ferganensis M.Pop.
Onosma azurea Schipcz.
Onosma brevopilosa Schischk. ex M.Pop.
Onosma ferganense M.Pop.
Onosma trachycarpa Levin.

Rindera ferganica M.Pop.
Rindera glabrata Pazij
Rindera oschensis M.Pop.
Rindera tschotkalensis M.Pop.
Stephanocaryum popovii R.Kam.
Tianschaniella umbellifera B.Fedtsch. ex M.Pop.

Family: Brassicaceae

Chorispora insignis Pachom.
Draba vvedenskyi Kovalevsk.
Erysimum alaicum Novopokr. ex E.Nikit.
Erysimum clausioides Botsch. et Vved.
Iskandera alaica (Korsh.) Botsch. et Vved.
Neuroloma album (E.Nikit.) Pachom.
Neuroloma botschantzevii Pachom.
Neuroloma korovinii (A.Vassil.) Botsch.
Neuroloma pulvinatum (M.Pop.) Botsch.
Neuroloma simulatrix (E.Nikit.) Botsch.
Neuroloma tianschanicum (E.Nikit.) Botsch.
Sisymbrium isfareense Vass. SE
Subendorffia botschantzevii R.Vinogradova

Family: Campanulaceae

Campanula eugeniae Fed.
Ostrovskia magnifica Regel

Family: Caryophyllaceae

Acanthophyllum coloratum Schischk.
Acanthophyllum gypsophiloides Regel SE
Acanthophyllum paniculatum Regel et Herd. SE
Arenaria ferganica Schischk. SE
Arenaria talassica Adyl. SE
Bolbosaponaria intricata (Franch.) Bondar. SE
Melandrium fedtschenkoanum (Preobr.) Schischk.
Silene adenopetala Raik. SE
Silene eviscosa Bondar. et Vved.
Silene fetissoyii Lazkov
Silene korshinskyi Schischk. SE
Silene ladyginae Lazkov
Silene obovata Schischk. SE
Silene schischkinii (M.Pop.) Vved.
Silene sussamyrica Lazkov

Family: Chenopodiaceae

Anabasis tianschanica Botsch.
Corispermum piliferum Iljin

Halothamnus ferganensis Botsch.

Salsola flexuosa Botsch.

Salsola pachyphylla Botsch.

Salsola roshevitzii Iljin

Salsola tianschanica Botsch.

Family: Convolvulaceae

Convolvulus grigorjevii R.Kam.

Convolvulus krauseanus Regel et Schmalh. SE

Family: Crassulaceae

Pseudosedum ferganense Boriss.

Rosularia schischkinii Boriss.

Sedum berunii Praton

Family: Cyperaceae

Carex ungurensis Litv .

Family: Euphorbiaceae

Andrachne pygmaea C.Koss.

Family: Fabaceae

Ammopiptanthus nanus (M.Pop.) Cheng. fil.

Astragalus aflatunensis B.Fedtsch.

Astragalus allotnchobus Nabiev

Astragalus bosbutooensis E.Nikit. et Sudn.

Astragalus caudicosus Galkina et Nabiev

Astragalus devestitus Pazij et Vved.

Astragalus dianthoides Boriss.

Astragalus dschangartensis Sumn.

Astragalus duanensis Saposhn. ex Sumn.

Astragalus excelsior M.Pop.

Astragalus fetissovii B.Fedtsch.

Astragalus imetensis Boriss.

Astragalus infractus Sumn.

Astragalus insuensis Bonss.

Astragalus involutivus Sumn.

Astragalus isphairamicus B.Fedtsch.

Astragalus keminensis K.Isakov

Astragalus kenkolensis B.Fedtsch.

Astragalus kirgisorum Gontsch.

Astragalus korotkovae R.Kam. et Kovalevsk.

Astragalus kugartensis Boriss.

Astragalus lavrenkoi R.Kam.

Astragalus litvinovianus Gontsch.

Astragalus merkensis R.Kam. et Kovalevsk.

Astragalus rarissimus M.Pop.
Astragalus reverdattoanus Sumn.
Astragalus sandalaschensis E. Nikit.
Astragalus tianschanicus Bunge
Calophaca pskemica Gorbunova
Calophaca tianschanica (B.Fedtsch.) Boriss. SE
Caragana laetevirens Pojark. SE
Caragana pruinosa Kom. SE
Chesneya quinata Fed.
Chesneya villosa (Boriss.) R.Kam. et R. Vinogradova
Colutea brachyptera Sumn. SE
Hedysarum acutifolium Bajt.
Hedysarum chaitocarpum Regel et Schmalh.
Hedysarum cumuschtanicum B.Sultanova
Hedysarum daraut-kurganicum B.Sultanova
Hedysarum enaffae B.Sultanova
Hedysarum gypsaceum Korotk.
Hedysarum kirgisorum B.Fedtsch.
Hedysarum krasnovii B.Fedtsch.
Hedysarum macrocarpum Korotk. ex Kovalevsk.
Hedysarum narynense E.Nikit.
Hedysarum parvum B. Sultanova
Hedysarum poncinsii Franch.
Hedysarum pulchrum E.Nikit.
Hedysarum santalaschi B.Fedtsch.
Hedysarum setosum Vved.
Hedysarum talassicum E.Nikit. et B.Sultanova
Hedysarum turkestanicum Regel et Schmalh.
Oxytropis arbaeviae Vass.
Oxytropis aurea Vass.
Oxytropis chantengriensis Vass.
Oxytropis fedtschenkoana Vass.
Oxytropis masarensis Vass.
Oxytropis ruebsaamenii B.Fedtsch.
Oxytropis scabrida Gontsch.
Oxytropis schachimardananica Filimonova
Oxytropis susamyrensis B.Fedtsch.
Oxytropis transalaica Vass.
Oxytropis tschakalensis L. Vassil.
Sophora korolkovii Koehne

Family: Iridaceae

Iridodictium kolpakowskianum (Regel) Rodionenko SE
Iridodictium winkleri (Regel) Rodionenko
Juno kuschakewiczii (B.Fedtsch.) Poljak.
Juno narynensis (O.Fedtsch.) Vved.

Juno zenaidae Vved.

Family: Lamiaceae

Alajja anomala (Juz.) Ikonn.

Lagochilus drobovii R.Kam. et Zuckerwanik

Lagochilus turkestanicus Knorr.

Nepeta pseudokokanica Pojark.

Phlomis drobovii M.Pop. et Vved.

Phlomis hypoleuca Vved.

Phlomoides cephalariifolia (M.Pop.) Adyl., R.Kam. et Machmedov

Phlomoides ferganensis (M.Pop.) Adyl., R.Kam. et Machmedov

Phlomoides knorringiana (M.Pop.) Adyl., R.Kam. et Machmedov

Phlomoides korovinii (M.Pop.) Adyl., R.Kam. et Machmedov

Phlomoides tythaster (Vved.) Adyl., R.Kam. et Machmedov

Phlomoides urodonta (M.Pop.) Adyl., R.Kam. et Machmedov

Otostegia nikitinae V. Scharaschova

Otostegia schennikovii V.Scharaschova

Salvia korolkowii Regel et Schmalh. SE

Salvia schmalhauseni Regel

Salvia wedenskyi E.Nikit.

Scutellaria andrachnoides Vved.

Scutellaria knorringiae Juz.

Scutellaria kugarti Juz.

Scutellaria lanipes Juz.

Scutellaria nepetoides M.Pop. ex Juz.

Scutellaria popovii Vved.

Scutellaria toguztoraviensis Juz.

Scutellaria urticifolia Juz. et Vved.

Scutellaria xanthosiphon Juz.

Ziziphora vichodceviana V. Tkatsch. ex Tuljaganova

Family: Liliaceae

Allium alaicum Vved.

Allium alexandrae Vved.

Allium altissimum Regel

Allium dasyphyllum Vved.

Allium dodecadontum Vved.

Allium elegans Drob.

Allium ferganicum Vved.

Allium filidentiforme Vved.

Allium glomeratum Prokh.

Allium gultschense B. Fedtsch.

Allium jucundum Vved.

Allium leptomorphum Vved.

Allium litvinovii Drob. ex Vved.

Allium oreophiloides Regel

Allium oreoscordum Vved.
Allium pskemense B. Fedtsch. SE
Allium saposhnikovii E. Nikit.
Allium semenovii Regel
Allium viridiflorum Pobed.
Allium zergencum F.Khassanov et R.M.Fritsch
Eremurus alaicus Chalkuziev
Eremurus zenaidae Vved.
Eremurus zoeae Vved.
Gagea circumplexa Vved.
Gagea davlianidzeae Levichev
Gagea ferganica Levichev
Gagea michaelis Golosk.
Gagea rufidula Levichev
Gagea talassica Levichev
Gagea toktogulii Levichev
Tulipa affinis Z.Botsch. SE
Tulipa dasystemonoides Vved.
Tulipa ferganica Vved. SE
Tulipa greigii Regel SE
Tulipa kaufmanniana Regel SE
Tulipa kolpakowskiana Regel SE
Tulipa korolkovii Regel SE
Tulipa neustrueviae Pobed.
Tulipa ostrowskiana Regel SE
Tulipa platystemon Vved.
Tulipa rosea Vved. SE
Tulipa subbiflora Vved.
Tulipa tetraphylla Regel SE
Tulipa zenaidae Vved. SE

Family: Limoniaceae

Acantholimon alaicum Czerniak. ex Lincz.
Acantholimon alexandri Fed.
Acantholimon borodinii Krasn.
Acantholimon compactum Korov. SE
Acantholimon karadarjense Lincz.
Acantholimon knorringianum Lincz.
Acantholimon langaricum O. et B.Fedtsch.
Acantholimon ruprechtii Bunge
Acantholimon sackenii Bunge
Acantholimon sarytavicum Lincz.
Gentiana saposhnikovii Pachom.
Gentiana susamyrensis Pachom.
Gentiana transalaica Pachom. et Tajdshan.
Ikonnikovia kaufmanniana (Regel) Lincz. SE

Limonium hoeltzeri (Regel) Ik.-Gal.
Limonium kaschgaricum (Rupr.) Ik.-Gal.
Limonium tianschanicum Lincz.

Family: Papaveraceae

Corydalis pseudoadunca M.Pop.
Fumariola turkestanica Korsh.
Roborowskia mira Batal. SE

Family: Pinaceae

Abies semenovii B. Fedtsch.

Family: Poaceae

Achnatherum saposchnikovii (Roshev.) Nevski
Festuca tschatkalica E. Alexeev
Littledalea alaica (Korsh.) V. Petrov ex Nevski
Puccinellia nudiflora (Hack.) Tzvel.
Stipa alaica Pazij
Stipa breviflora Griseb.
Stipa bungeana Trin.
Stipa magnifica Junge
Stipa talassica Pazij
Stipa tianschanica Roshev.

Family: Polygonaceae

Calligonum calcareum Pavl.
Calligonum santoanum Korov.
Polygonum atraphaxiforme Botsch. SE

Family: Primulaceae

Primula eugeniae Fed.

Family: Ranunculaceae

Aconitum angusticassidatum Steinb.
Delphinium keminense Pachom.
Delphinium knorringianum B.Fedtsch.
Delphinium nikitinae Pachom.
Paeonia hybrida Pall.
Paraquilegia scabrifolia Pachom.
Pulsatilla kostyczewii (Korsh.) Juz.
Ranunculus ovczinnikovii Kovalevsk.

Family: Rosaceae

Amygdalus susakensis Vass.
Cerasus alaica Pojark.
Crataegus ferganensis Pojark.

Appendix M – Endemic Plants of the Kyrgyz Republic

Crataegus isfajramensis Pachom.
Crataegus knorringiana Pojark.
Malus niedzwetzkyana Dieck SE
Pyrus korshinskyi Litv .SE
Pyrus regelii Rehd. SE
Sibiraea tianschanica Pojark.
Sorbaria olgae Zinserl.
Spiraeanthus schrenkianus Maxim. SE

Family: Rutaceae

Haplophyllum monadelphum Afan.

Family: Santalaceae

Thesium ferganense Bobr .

Family: Saxifragaceae

Saxifraga vvedenskyi Abdullaeva

Family: Scrophulariaceae

Euphrasia macrocalyx Juz.
Linaria alaica Junussov
Linaria fedorovii R.Kam.
Linaria saposhnikovii E.Nikit.
Nathaliella alaica B.Fedtsch.
Pedicularis alaica A. Li
Pedicularis gypsicala Vved.
Pedicularis tianschanica Rupr .

Family: Solanaceae

Physochlaina alaica E.Korot.

Family: Thymelaeaceae

Restella albertii (Regel) Pobed.
Stelleropsis issykkulensis Pobed.
Stelleropsis tianschanica Pobed.

Appendix N:

Species Diversity Summary Tables for the former Soviet Central Asian Republics

Species Diversity Summary Tables for the former Soviet Central Asian Republics

Table N1. Total Numbers of Plant and Animal Species in the Five Former Soviet Central Asian Republics.

Country	Area (sq. km)	Vascular Plants	Lower Plants	Vertebrates	Invertebrates
Kyrgyzstan	198,500	3786	3676	563	>10,000
Kazakhstan	2,072,000	~6000	~3000	835	>50,000
Tajikistan	143,100	No Data	No Data	541	No Data
Uzbekistan	447,400	~4500	No Data	682	~15,000
Turkmenistan	488,100	~3000	No Data	695	No Data

Source: Daviesson 2001a,b,c, and d, Abdurahimova 2001, MEP 1998

Table N2. Total Numbers of Vertebrate Species in the Five Former Soviet Central Asian Republics, by Taxa.

Country	Mammals	Birds	Reptiles	Amphibians	Fish	Total Vertebrates
Kyrgyzstan	83	368	33	4	75	563
Kazakhstan	178	489	49	12	107	835
Tajikistan	81	365	44	2	49	541
Uzbekistan	108	431	58	2	83	682
Turkmenistan	103	397	82	5	108	695

Source: Daviesson 2001a,b,c, and d, Abdurahimova 2001, MEP 1998

Appendix O:

Definitions of the International Union for the Conservation of Nature (IUCN) Protected Area Management Categories

Definitions of the IUCN Protected Area Management Categories

Source:

United Nations Environment Program - World Conservation Monitoring Center

Protected Areas and World Heritage Programme

Protected Area Management Categories

http://www.unep-wcmc.org/index.html?http://www.unepwcmc.org/protected_areas/categories/~main

Accessed June 28, 2005

Category Ia

Strict Nature Reserve: protected area managed mainly for science.

Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

Category Ib

Wilderness Area: protected area managed mainly for wilderness protection .

Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.

Category II

National Park: protected area managed mainly for ecosystem protection and recreation.

Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

Category III

Natural Monument: protected area managed mainly for conservation of specific natural features.

Area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.

Category IV

Habitat/Species Management Area: protected area managed mainly for conservation through management intervention.

Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

Category V

Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation.

Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

Category VI

Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.

Area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

Appendix P:

List of Ongoing Conservation and Ecotourism Projects in Kyrgyzstan and the Tian Shan

List of Ongoing Conservation and Ecotourism Projects in Kyrgyzstan and the Tian Shan

1. GEF Central Asia Transboundary West Tien-Shan Biodiversity Project
<http://www.catbiodiversity.net/eng/>

The goal of this project is to establish a vast UNESCO-MAB designated biosphere reserve, covering the entire West Tian Shan of Kyrgyzstan, Kazakhstan, and Uzbekistan, for the protection and improved management of both natural and cultural landscapes.

2. TACIS “West Tian Shan Biodiversity Project“
<http://www.mnt.kg/showmntproject.php?id=32>

This project is working in tandem with the above GEF project for the establishment of the West Tian Shan Biosphere Reserve, however, the TACIS effort is focused on creation of a legal framework for establishment of the reserve.

3. GTZ – Issyk-Kul Biosphere Reserve
<http://www.gtz.de/en/weltweit/europa-kaukasus-zentralasien/655.htm>
<http://www.unesco.org/mab/br/focus/2002Oct/Issyk.htm>

This project resulted in designation of the entire province of Issyk-Kul as a UNESCO-MAB Biosphere Reserve in 2001, and now focuses on organizing the administration of the reserve, promoting tourism, and encouraging sound land-use practices in the province.

4. International Snow Leopard Trust (ISLT)
<http://www.snowleopard.org>

In partnership with local NGO's and scientists, ISLT has conducted Snow Leopard Information Management System (SLIMS) workshops in the region to promote systematic monitoring of snow leopard populations in the Tian Shan and elsewhere in Inner Asia. ISLT has also sponsored Snow Leopard/Irbis Enterprise trainings in Kyrgyzstan to promote a handicraft industry in villages near Kyrgyzstan's primary snow leopard sanctuary, the Sarychat-Ertash Nature Reserve, so that these villagers have an alternative source of income to poaching of the reserve's wildlife.

5. Fauna and Flora International (FFI)
<http://www.fauna-flora.org/eurasia/kyrgyzstan.html>

FFI sponsors a small grants project to fund both small business and environmental projects in rural communities of Kyrgyzstan's Issyk-Kul and Naryn Provinces. FFI is also currently conducting a project to improve ranger training at the Sarychat-Ertash Nature Reserve in Issyk-Kul Province.

6. Bashat (formerly the Community and Business Forum)

<http://www.kyrgyzstan-cbf.org/index.htm>

Bashat is a local Bishkek-based NGO that conducts a variety of community development, small business, environment, and education projects. Bashat is also the primary in-country partner of ISLT and FFI.

7. Helvetas

http://www.helvetas.kg/pr_bpp_en.shtml

Helvetas is a Swiss organization that conducts projects to improve agricultural practices in Kyrgyzstan. Helvetas has also helped create a network called "Community Based Tourism" (CBT) that has set up tourist information offices in a number of Kyrgyz communities that provide tourists with guides, drivers, and accommodation in local homes or yurt camps.

8. Community Based Tourism

http://cbt.in.kg/en/home_en

An organization resulting from the efforts of Helvetas, above, which seeks to improve rural incomes through promoting tourism at a local level.

9. NABU

http://www.nabu.de/m01/m01_06/00297.html

NABU is a German wildlife conservation organization that is currently funding a project in Kyrgyzstan that seeks to prevent poaching of snow leopards and educate local citizens about threats to the species. The project operates primarily in Issyk-Kul Province.

10. Xinjiang Conservation Fund

<http://www.greenxinjiang.org/English.htm>

The Xinjiang Conservation Fund (XCF) is a Beijing-based organization that seeks to promote conservation and development of NGOs in Xinjiang. XCF recently partnered with the International Snow Leopard Trust to sponsor a survey of snow leopard habitat in Xinjiang.

Appendix Q:

Metric Unit Conversion Information

Metric Unit Conversion Information

To convert degrees centigrade to degrees Fahrenheit: multiply by $9/5$ and add 32

To convert millimeters to inches: divide by 25.4

To convert meters to feet: multiply by 3.28

To convert kilometers to miles: divide by 1.61

To convert hectares to acres: multiply by 2.47

To convert square kilometers to square miles: divide by 2.59

To convert cubic km to cubic mi.: divide by 4.17

